PLASTICS

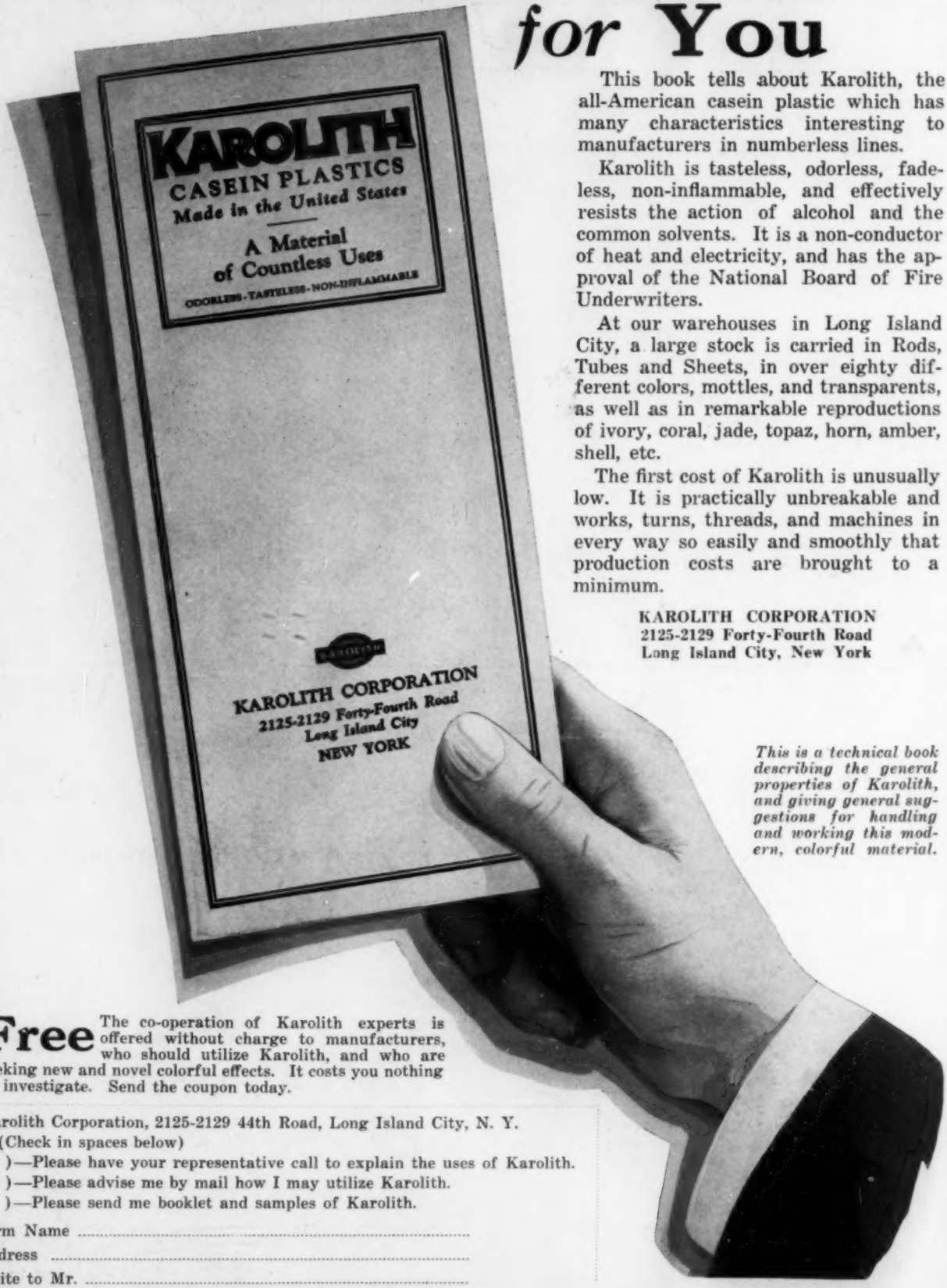
A Periodical Devoted to the Manufacture and Use of Composition Products

NOVEMBER, 1927

Molded Products

See Page 621

A Valuable Book *for* You



This book tells about Karolith, the all-American casein plastic which has many characteristics interesting to manufacturers in numberless lines.

Karolith is tasteless, odorless, fadeless, non-inflammable, and effectively resists the action of alcohol and the common solvents. It is a non-conductor of heat and electricity, and has the approval of the National Board of Fire Underwriters.

At our warehouses in Long Island City, a large stock is carried in Rods, Tubes and Sheets, in over eighty different colors, mottles, and transparents, as well as in remarkable reproductions of ivory, coral, jade, topaz, horn, amber, shell, etc.

The first cost of Karolith is unusually low. It is practically unbreakable and works, turns, threads, and machines in every way so easily and smoothly that production costs are brought to a minimum.

KAROLITH CORPORATION
2125-2129 Forty-Fourth Road
Long Island City, New York

This is a technical book describing the general properties of Karolith, and giving general suggestions for handling and working this modern, colorful material.

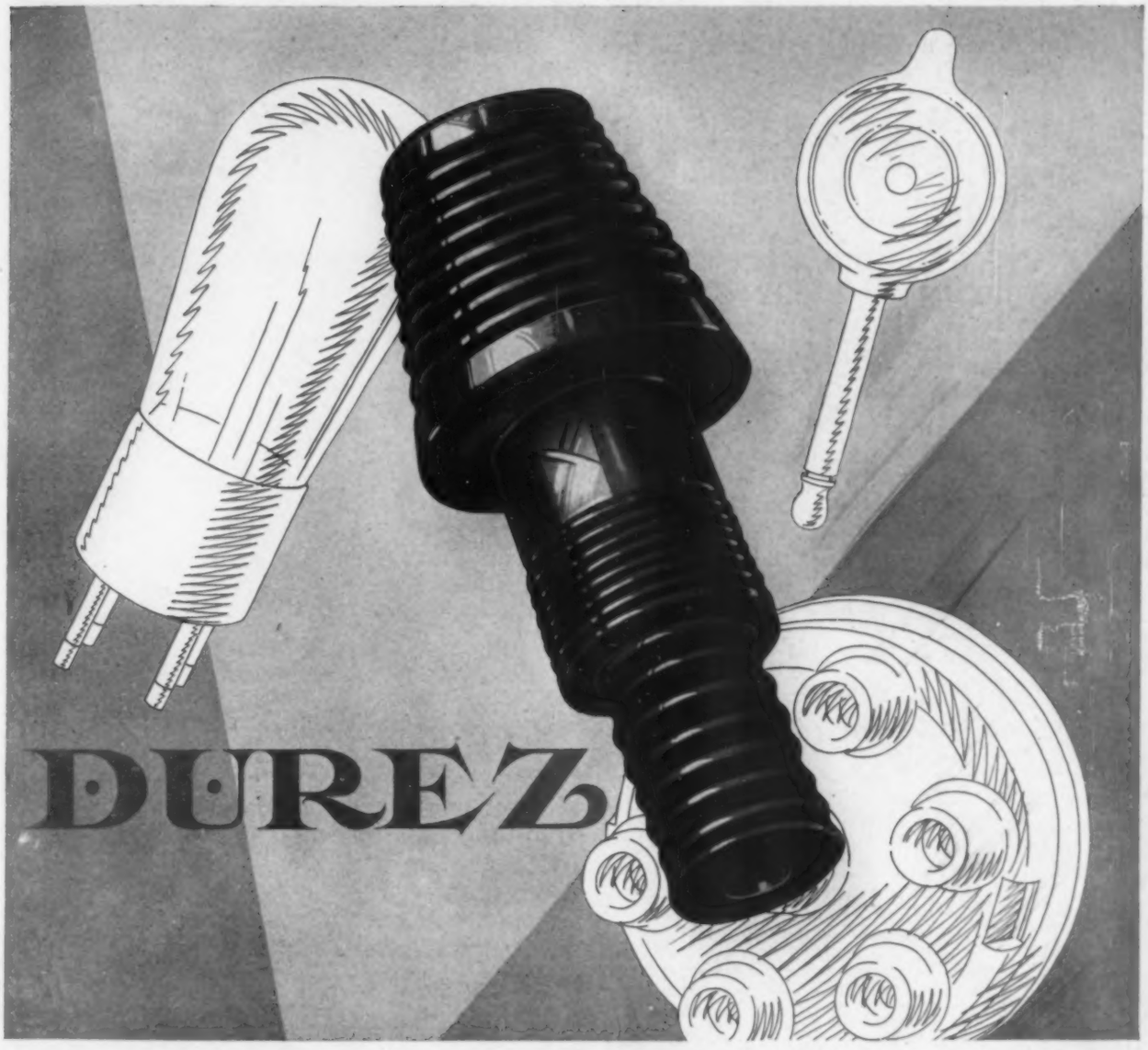
Free The co-operation of Karolith experts is offered without charge to manufacturers, who should utilize Karolith, and who are seeking new and novel colorful effects. It costs you nothing to investigate. Send the coupon today.

Karolith Corporation, 2125-2129 44th Road, Long Island City, N. Y.
(Check in spaces below)

( )—Please have your representative call to explain the uses of Karolith.
( )—Please advise me by mail how I may utilize Karolith.
( )—Please send me booklet and samples of Karolith.

Firm Name .....
Address .....
Write to Mr. .....

PLASTICS, Vol. III, No. 11, November, 1927. Publication office 49 E. Washington Avenue, Washington, N. J. Executive office, 471 Fourth Ave., New York City, N. Y., by The Hoffman Publications, Inc., Sylvan Hoffman, President. Subscription price, Domestic $3.00 per year, 35c per copy. Foreign and Canada, $4.00 per year. Entered as second-class mail at the Post Office at Washington, N. J., under the act of March, 1879, and copyright, 1927, by The Hoffman Publications, Inc.



DUREZ — molded parts with high dielectric strength and permanent lustrous finish — DUREZ

DUREZ molded parts have a rapidly increasing range of application in the radio, automotive and electric appliance industries wherever a combination of high dielectric strength and excellent appearance are essential. Durez is electrically non-conductive, non-inflammable and is resistant to heat. It has a permanent high luster after molding, and neither wear, age nor deteriorating agencies affect its attractiveness. The surface will not crack, check or scar.

Durez molds with perfect accuracy. It duplicates exactly the smallest detail of intricate design. Complex parts can be made rapidly in a single operation, and the high mechanical strength of Durez makes thin section molding entirely practical.

An electric appliance with Durez parts has added structural strength, greater insulation and enduring beauty. Ornamental wall brackets and central lighting fixtures molded with Durez combine utility with a pleasing decorative effect. Use Durez for radio tube bases, dials, panels and other parts; for automotive ignition devices; for a great variety of electrical appliances and novelties.

Durez is speeding the production and improving the products of many industries. Use the facilities of the Durez laboratory to determine its place in your process. Counsel and investigation without obligation.

Molded samples of Durez and complete data sent on request. Specify use and color.

GENERAL PLASTICS
INCORPORATED
NORTH TONAWANDA, NEW YORK
CHICAGO NEW YORK SAN FRANCISCO

DUREZ

SEND FOR SAMPLE BOOKLET "DO IT WITH DUREZ"

This is the most striking point of difference between Inda, the perfected casein solid, and other materials of a competitive nature—

Inda is absolutely non-inflammable.

Inda may therefore be safely used everywhere—a particularly advantageous point to consider in such products as toilet articles, pens and pencils, candlesticks, buttons, cigarette cases and holders and novelty jewelry.

And in Inda whether plain or in rich mottles of rare beauty, the colors run entirely through the materials. They are not applied to the surface only.

Ask to see samples in sheet, rod or tube form.

AMERICAN MACHINE & FOUNDRY CO.
5502-5524 SECOND AVE., BROOKLYN, N. Y.

PLASTICS & MOLDED PRODUCTS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 3 NOVEMBER, 1927 No. 11

Contents

Publication Office: Washington, N. J.
Offices: 471 4th Ave., New York. Telephones: Ashland 6280, 6281
SYLVAN HOFFMAN, Publisher ALAN COHEN, Adv. Director
E. D. Sheriffs, Chicago Representative
80 E. Jackson Blvd.
Subscription Price—U. S. $3.00, Foreign $4.00 Per Year Issued Monthly—35 cents a copy

PLASTICS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 3 NOVEMBER, 1927 No. 11

Colloid Chemistry and Technology of Synthetic Plastics

How the orientation of submicroscopic particles affects the properties of materials

By Otto Manfred and Josef Obrist

In the highly interesting scientific article that begins with the present issue, the authors point out and discuss the colloid-chemical and other technological aspects of the plastic materials. The question as to what causes plasticity, and the influence of composition upon plastics flow of a number of the modern molding materials is gone into deeply.

We feel certain that this original article, contributed by two men who stand high in their profession, will be of great interest to workers on the scientific phases of plastics. Mr. Otto Manfred is an inventor active in the field of synthetic materials, while Dr. Josef Obrist is connected with the Physical Institute of the German Technical High School at Brunn, in Czechoslovakia.

IT is only very recently that the technology of plastic materials has emerged from the period of the most primitive and empiracal "rule-of-thumb" methods, and has made at least some of the modern attainments of science its own. The tremendous energy devoted to the development of our present plastic materials is astonishingly evidenced by the huge mass of inventive ideas and patent applications that pervades this field of endeavor. This is especially marked in the case of organic plastic materials, which, more perhaps than any other, have given an impetus to the most diligent search for new sources of products that might serve the purpose.

Old Conceptions

The actual improvements attained were, however, with few exceptions, out of all proportion to the large amount of energy devoted to the task, and the money expended in experimental work. The raw materials and products that had to be dealt with in the compounding or development of new thermo-plastic materials were only in a few isolated cases made the subject of exhaustive scientific researches; and this resulted in much confusion. It is safe to say, that as far as the technology of plastic materials was concerned, much of the work of the past was a more or less successful "groping about in the dark."

Not until modern colloid chemistry began to develop and expand did real progress become possible. Colloid chemistry, dealing with the interrelationship of the state of subdivision of a substance and its resultant physical and chemical properties, opened up some very promising avenues of approach for the study of the technology of plastic materials. It can be said with positive assurance that the "plastic" state of a substance is simply a special form of colloidal condition.

Colloids

It has now been recognized that the most important organic plastic materials, such as caoutchoucs, proteinoplastics (albuminoid plastic materials), phenoplastics (phenolcondensation products), aminoplastics (urea-aldehyde condensation products), and the cellulose plastics, are simply typical colloids, whose properties bear an intimate relationship to the "grain size" of their ultimate particles. By a deliberate modification of this grain size, it becomes possible, within fairly wide limits, to control the properties of these plastic substances, and to increase or decrease their modulus of elasticity, their modulus of torsion, resistance to bending strains, hygroscopicity and similar properties.

Just what are the phenomena, viewed from a colloid-chemical standpoint, that take place when

a given raw material becomes plasticized? One method of investigating these conditions is the optical method. A number of plastic materials exhibit the phenomena of double refraction, due either to minute rods or lamellae, thus furnishing evidence to the fact that these plasticized substances are in reality constituted of mixtures of materials both of which consist of submicroscopic particles having the form of rods or tiny plates, approaching in size to the wavelength of light. These minute particles, therefore, to show this phenomenon, must needs be oriented in a given direction and imbedded in a solid medium. This may even be true of the iso-colloids (such as the proteinoplastics and artificial resins) in which the dispersed or distributed phase may be identical with the dispersing agent.

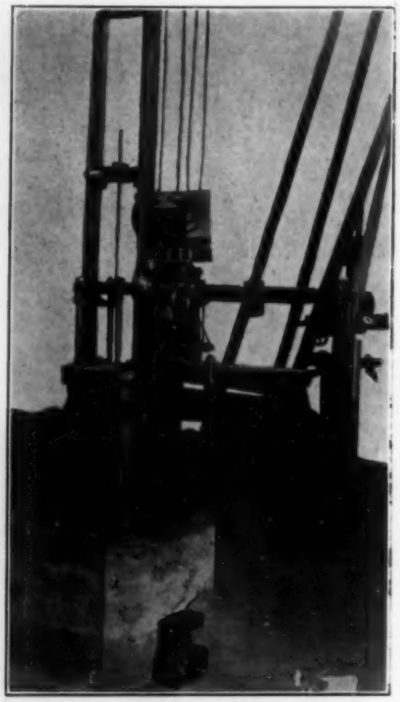
Orientation

In such cases, the occurence of double refraction is a secondary effect, caused by the flow of the particles during the plasticization. As the plastic material is subjected to directional stresses during the molding or extruding operation, the originally non-oriented particles become aligned and oriented, forming either very short linear structures having some analogy to small fibers, or arrange themselves into minute plates or lamellae.

Plasticizing

From a technological point of view, plasticization therefore really consists of two phases, in that the first is a transition of the raw material into a suitable fine state of subdivision, followed by a reaggregation of the thus obtained dispersed phase into a one or two dimensional elementary state, that is to say into a filamentous or film stage. This one or two-dimensional phase then either becomes felted or matted and reaggregates itself into a three-dimensional body having the well-known plastic properties usually associated with materials of which we speak as "being plastic." These various steps can be followed quite closely in the various well-known representative substances used in plastic forming, such as the proteinoplastics, the artificial resins and the cellulosic materials.

In the case of the proteinoplastics, the change into the disperse state usually comprises the disintegration of casein or



Tension-compression machine such as is used for determining the moldulus of elasticity. An extensomther may be used with it to determine the amount of stretch.

Photo. Courtesy of Electrical Testing Laboratories, N. Y.

a similar albuminoid material by mechanical means, such as mills; followed by intumescence induced by admixture with a solvent such as water and certain chemicals. The intumescence, however, is really a means for dispersing the material, the water playing the role of a peptizing agent, so as to continue further the disintegration initiated by the mechanical grinding. However, a very important point is not to carry the dispersing to such a degree that the individual "building blocks" or particles are destroyed, as they must retain an appreciable dimension at least in one direction; that is to say they must not be less than filamentous. Were the particles reduced to the ultimate state of disintegration, then plasticity as an inherent property would be lost, and no reaggregation as such could take place.

Such loss of plasticity is a well known commercial phenomenon, and is spoken of as the "dead grinding" of cellulose in the manufacture of paper; the dead-grinding of casein; and the "dead-rolling" of rubber mixtures. It will therefore be evident that the mechanical and chemical disintegration of a material for the production of a plastic substance therefrom must not be carried beyond quite definitely determinable points. This might be termed the "colloidal optimum". The requisite reaggregation of the material to a true plastic usually takes place under mechanical pressure and heat up to from 80 to 85°C; there being four general methods in use. These are:

a) Extrusion, by extrusion presses.

b) Rolling into sheets.

c) Pressing either a or b into blocks.

d) Pressing a powdered material.

Elasticity

It lies within the nature of the above methods of working that the reaggregation becomes less complete in the order as given in the above table. This fact is plainly evidenced by the elasticity of the products made by any of these methods. The materials made by extrusion, such as for example the casein solids, Erinoid, Karolith, Inda, etc.), have the greatest elasticity; this resulting from the effective orientation of the colloidal particles caused by the long flow of the material in the extrusion process. Casein solids rods, for example have a modulus of elasticity of from 28,000 to 30,000 kilograms per square centimeter.

Casein solids plates, made from such rods by pressing the same together, causes a lowering of this modulus of elasticity by reason of the transverse flow thus occasioned, and the greater reaggregation, which therefore will be less than that of the rods, and has been found to be from 25,000 kilograms per square centimeter and downwards, in other words, the elasticity is greater.

Casein solids made from sheets that have been rolled and then piled up and pressed together (such as Neolith, Galoid etc.) show a less degree of reaggregation, and the modulus of elasticity of such products may be as high as 40,000 kilograms per square centimeter. An exception to this general rule seems to occur with the product know as Oyogalith, which is made in accordance with the process described in French Patent 472192; and is made in a blocking press. Single sheets of this material may show a modulus of elasticity of about 30,000 kilograms per square centimeter. This makes the Oyogalith similar in quality to the Galalith and Erinoid type of product. In such cases however, the inherently lower degree of plasticization is reinforced by the addition of plasticizing agents, which push the dispersion closer to the colloidal optimum.

Role of Plasticizers

The role played by the so-called "plasticizing agents" is in reality that of a peptising or pectizing agent which acts upon the raw material. In the case of casein, this action is exerted by such substances as small amounts of acids and alkalies, ammonia, as well as aliphatic and aromatic amines.

At the lowest point, as regards elasticity, are the products that are produced by being pressed from a powder (such as Akalit, Glorith), which are made by taking finely pulverized casein, slightly dampened, piling it up in a blockpress frame, and pressing it into plates under high pressure at a temperature of from 60 to 80°C. This only causes a slight relative movement of the particles, so that only a slight orientation of the particles can take place, and but little of what might be called "chain-link-formation" takes place. The resultant products are therefore not as elastic as the others, the modulus of elasticity being as high as 44,000 kilograms per square centimeter.

Artificial Resins

Genetically directly opposite are the conditions encountered in the production of artificial resins. In this case the raw materials are available in their molecularly dispersed form (as for example phenol and an aldehyde; or urea and an aldehyde). In this case the necessary colloidal dimensions of the particles which constitute the resulting materials as a plastic must be attained not by *dis*integration, as in case of the proteinoplastics, but by an *increase* in the size of the individual molecular particles; in other words, by *ag*greation. The various plasticizing agents recommended for use with such artificial resins, act, therefore, to regulate the particle size.

The necessary flowing action or stream-effect to bring about the required colloidial properties have been correctly recognized as being the result of proper stirring during the condensation of the substances that are employed in the formation of synthetic resins. Carleton Ellis deserves credit for having pointed out, in his book on "Synthetic Resins and Their Plastics", that proper mechanical stirring has a beneficial action on synthetic resins, basing his observation on purely practical considerations and results. The "casting" of highly viscous reaction-products resulting from the condensation gives rise to further streaming and flowing, and therefore increases the orientation of the submicroscopic particles, and gives them an opportunity to form chains and other connected forms, that lend strength and elasticity to the resulting products.

Effect of Free Flow

The effect of this streaming and flowing is very beautifully brought out by some experiments made on blocks and rods

(*Continued on page 619*)

Phenol and Formaldehyde as a Cellulose Acetate Solvent

A RATHER peculiar process, that on its face appears to describe what is probably a combination of cellulose acetate, phenol and formaldehyde, is described in a patent issued August 30th, 1927, to Robert H. Chathan, assignor to Celanese Corp., U. S. P. 1,640,596.

Paper, textile materials or fabrics are impregnated with a solution of one pound of cellulose acetate in 1,500 cubic centimeters of 99% phenol and 1,500 cubic centimeters of 40% formaldehyde and 1,000 cubic centimeters of alcohol. This mixture of phenol, alcohol and formaldehyde is said to be a solvent for the cellulose acetate.

The solution is applied to paper, fabrics and the like, as for example by passing the same between rolls, the lower of which dips into this solution. The thus impregnated fabric then passes into water which precipitates the cellulose acetate upon the fabric and forms a close union with the same. There is nothing said as to what becomes of the phenol and formaldehyde. However, the fabric can afterwards be hot pressed. One can only surmise that some combination takes place, or that the phenol and formaldehyde are perhaps recovered. Only one claim mentions the phenol and formaldehyde, the other claims broadly covering the idea of treating paper, etc. with a solution of a "cellulose derivative" that is afterwards precipitated upon the paper by a liquid precipitant, such as water.

Some Recent Advances in the Cellulose Ester Art

Use of fatty acids of vegetable oils with cellulose nitrate; reduction of viscosity of cellulose esters; and recovery of camphor from films all form subjects of patents

Compiled from patent specifications by Carl Marx

THREE interesting patents bearing particularly on the cellulose ester art have been issued within a space of about five weeks. Two of them are the products of the research workers of E. I. DuPont de Nemours & Co., while the third originated in the laboratories of the Ellis-Foster Co., of Montclair, N. J.

Taken in their chronological order, the first one, U. S. P. 1,636,683; June 28, 1927, is the invention of Geo. L. Schwartz, and concerns a cellulose ester composition, particularly cellulose nitrate or pyroxylin, in which higher fatty acids, such as fatty acids with a carbon content of from 6 to 18 atoms are employed as softeners to render the composition non-brittle and flexible. Primarily, coating compositions are aimed at, but obviously the products are not necessarily limited to this use, as modifications may easily lead to very serviceable plastics.

The actual softeners employed are likewise patented, the patent having been issued in 1925 (U. S. P. 1,558,299), but the present application concerns itself with the pyroxylin compositions in admixture with these softeners.

No text book on the subject of an art as prolific as that of the Plastic materials can hope to remain up to date for more than a year.

To supplement the few good works on the subject of the cellulose esters, we aim to keep abreast of the times by publishing rather more in detail than by mere abstracts, the patents and foreign literature pertaining to this art.

The Vegetable Oils as Softeners

The vegetable oils have long been used as softeners of pyroxylin, and in particular castor oil and blown rapesed oil have been used. Both of these oils are glycerides of unsaturated fatty acids. Their iodine numbers are high, and probably as a result of this unsaturated condition they are subject to certain physical or chemical changes. For example, castor oil readily becomes rancid when exposed in a pyroxylin film and it gradually undergoes oxidation which causes a hardening of the film. Practically the only low melting vegetable oil that does not have a high iodine number is coconut oil. This oil is available in large quantities and would be an excellent softener of pyroxylin if its melting point were somewhat lower. It is much less subject to rancidity development and to gradual oxidation than oils now used, because the percentage of unsaturated glycerides, which it contains is very low.

Additional Solvents

It is often desirable to use as a softener a substance which has mild solvent power for pyroxylin. All of the known vegetable oils are practically without solvent action on pyroxylin, and it has heretofore been thought necessary, if solvent power was required, to add a solvent softener to the vegetable oil.

If an acyl group of a lower fatty acid be introduced into one or more of the glycerides of coconut oil, or of various other vegetable oils, the solvent power of the resulting glyceride for pyroxylin is appreciably increased, while at the same time the freezing point of the glyceride is lowered. This lowering of the freezing point is sometimes quite marked. Commercial coconut oil, for example, has a freezing point of from 14 to 22° C., whereas, after the introduction of an acetyl group to form a mixed ester, the melting point is usually between —5 and —13° C., the exact value depending upon the extent to which the acetyl group has displaced higher fatty acid radicals in the glycerides present.

Where the new softener has been obtained by the action of acetic acid on coconut oil, of which the chief constituent is the glyceride of lauric acid, the new softener will consist of a mixture of mixed esters of which the major part will be acetyl-laurin, with acetyl-palmitin and acetyl-myristin present in small proportions.

Making the Softener

To make the softener, the following ingredients are mixed in a flask that is provided with a reflux condenser and are heated for 1¾ hours in an oil bath at a temperature where the acetic acid boils vigorously.

The materials are boiled, the acetic acid being constantly returned to the flask.

	Parts by weight
Glycerine (containing 5% water)	967
Glacial acetic acid (99.5% acid)	2250
Coconut oil acids (mean mol. wt. 208)	1560
Sulfuric acid	0.7

The condenser is then changed to a distilling position and as the acetic acid concentration decreases the temperature of the mixture rises and is held at 160-175° C. throughout the remaining heating period. A stream of nitrogen is passed through the mixture throughout this latter heating stage to sweep out water as formed. After neutralization is practically complete the crude product is washed with an aqueous sodium chloride solution to remove sulfuric acid. The washed product is then heated for two hours on a steam bath with 2% of its weight of decolorizing carbon and is filtered. The finished product obtained by carrying out this process on a small scale was a light brown, transparent, oily liquid with a slight odor resembling coconut oil and freezing at —10 to —11° C. It contained 1.03% free coconut oil acids. The yield was 87.2% of the theoretical. The finished product is miscible in all proportions in mineral oil; it colloids pyroxylin at normal temperatures; and it does not become rancid.

Properties of New Softeners

A mixture of mixed glycerides prepared by the above method is practically non-volatile and cannot be distilled at pressures as low as 14 mm. without partial decomposition. This product consists of a mixture of all the possible glycerides of acetic acid and coconut oil acids, ranging from triacetin through the mixed glycerides to and including some coconut oil. The freezing point varies according to the ratio of acetyl to coconut oil acid groups and usually falls within the range of —5 to —13° C.

The new softeners, when obtained from oils such as coconut oil, may be defined generally as mixtures of acetyl derivatives of glycerides of two or more higher fatty acids each having from 10 to 16 carbon atoms. The glyceride mixture prepared in accordance with the above examples will contain a substantial proportion of diacetyl-glycerides of the higher fatty acids, as, for example, diacetyl-laurin, diacetyl-myristin, and diacetyl-palmitin.

In addition to the alpha-mono-acetyl-laurin, the new softener contains the beta-mono-acetyl derivative of the various glycerides; and in addition to the alpha-gamma-diacetyl derivative, the alpha-beta- diacetyl derivative is believed to be formed, although in minor proportions.

An approximate idea of the relative proportions of the mixed esters of the various glycerides obtained by my process,

(*Continued on page 612*)

Printing on Celluloid

Modern Methods Far Superior

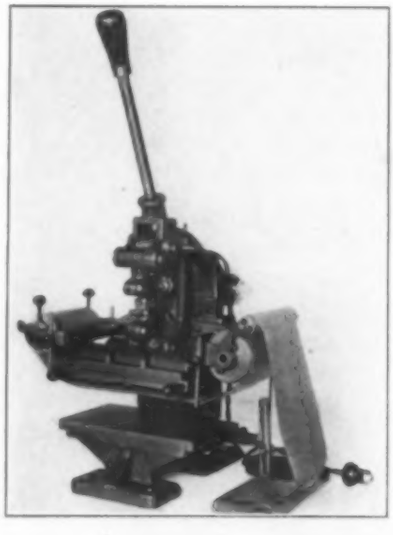
By A. Jaekel

From Die Celluloid Industrie, 1927, 41, 1775

ORIGINALLY no attempts were made to print upon the pyroxylin plastics, and any inscriptions, ornamentations, etc., placed on this material were simply blanked into the material without any ink or color.

Early efforts were directed toward making deep impressions by the aid of a heated metallic stamp worked by hand; to be followed somewhat later in the line of development by the use of small stamping machines. The stamp, at this stage of development, was fastened to one part of the press, and was heated by a gas or alcohol flame, leading to considerable danger in the operation. The deep impression left by the heated stamp on the pyroxylin plastic material was then filled with wax, suitably colored; or the impressions were hand-colored with aniline dyes, bronze powder suspended in a solvent such as amyl acetate and the like. The ornamentation of pyroxylin plastics at one time was an out and out hand operation.

Later developments brought a type of stamping machine in



Small hand stamping press equipped with roll leaf feeding device; made by Standard Tool Co. (Photo courtesy of Peerless Roll Leaf Co.)

which the stamp was not heated directly, but the flame was enclosed and served to heat up the head of the press; and although this greatly diminished the danger of igniting the pyroxylin plastics, there nevertheless remained the possibility of over-

(*Continued on page 616*)

The Manufacture of Casein Solids

X. Drying the hardened casein sheets, rods and tubes, requires careful attention to detail if perfect products are to result

By Heinrich Prehn

Consulting Engineer; German Correspondent of Plastics

The hardening of casein plastics by means of formaldehyde was described in detail in our October issue. The present article deals with the drying processes employed to bring the products to their final commercial stage. The fabrication of articles, polishing, etc., remain to be described in future articles. The author, Mr. Heinrich Prehn, is actively engaged in consulting work in this particular field, and is a recognized authority abroad. He specializes in the installation of casein plastics' machinery and equipment, and, hence, writes from the practical viewpoint of an expert.

THE drying and hardening of plastic materials results from evaporation, or from cooling, or, finally, from chemical reactions which take place within the material. In many cases artificial drying, by the aid of heat, is resorted to. This is the case with the casein solids.

In all drying operations involving plastic materials it is essential that such drying take place gradually. The articles should first be subjected to a uniform but low temperature, which should only be raised as the moisture content decreases. Rapid and uneven drying sets up such internal stresses in the material that the same will invariably crack and split. This is caused by the drying of the outer layers before all the moisture has escaped from the interior of the material, and the pressure of the moisture from within, as it evaporates, causes the splitting of the outer layers.

Preliminary Drying

In order to avoid this, the proper drying of casein solids contemplates a preliminary desiccation at room temperatures, or certainly not above 30 degrees Centigrade. (86°F.). The length of this preliminary natural drying can be roughly calculated from the thickness of the material. The normal time thus ascertained is approximately equivalent to one third of the thickness in millimeters expressed in terms of days. For example: a 6 millimeter plate should be dried at room temperature for 2 days; and a 9 millimeter plate for 3 days.

The final drying of the casein solids takes place in directly heated chambers, into which heated air is passed. The size and arrangement of these drying chambers is optional, and varies in accordance with the space available and the general layout of the plant. The outer walls of such casein solids driers should be constructed of massive masonry, and should be well insulated so as to limit the loss of heat. The material is supported, depending upon its shape, thickness and nature, either upon racks, shelves, suspension devices, or upon tray racks provided with wheels. The main desideratum is that the articles be completely exposed to the heated air that is to remove the moisture.

Constant Air Circulation

In drying, it is more essential to insure a constant supply of fresh dry air, than to supply heat units. An even temperature is more important than high heat, and the moisture-saturated air must be constantly removed and replaced by dry air. The heating coils or devices may be located either at the top or the bottom of the chambers, the draft being so adjusted that in case the heaters are at the top the draft is downwards, and vice versa. Suitable dampers for regulating the admission and circulation of air are quite essential to a properly constructed drying plant. The regulation of the draft, heat, etc., must occur from the outside, and it is very advisable to have windows in the drying chambers. These windows should open toward the outer air. Thermometers, strategically placed at the important locations in the chambers, and visible from the outside; as well as inspection windows in the chambers, are features which should not be omitted, if proper drying is to be effected.

Proper Installation

The proper installation of a casein solids drying outfit should be under the supervision of an expert, and should be adapted to the particular needs of the plant. Special precautions must be taken if the output of the plant differs from the usual run of material. Heavy plates, tubes, etc., require special treatment, and should have driers of their own. While it might appear as though the drying of casein solids were a relatively simple thing, difficulties often make their appearance. The proper diagnosis of drying trouble is not easy, and much difficulty can be avoided by correct planning and operation of the drying plant. For example, there must be sufficient open spaces in the supporting racks to allow even drying, as otherwise the material will

be so badly twisted and deformed that the final straightening, to be described later, will be accompanied by much difficulty.

Correctly dried casein solids sheets and rods will not be appreciably warped by drying, nor will they split and crack in the subsequent straightening operations. Too rapid, or uneven drying must be avoided absolutely. The main object to be attained is to supply drier and drier air as the articles gradually lose their moisture, so that the drying will progress through to the center of the articles. However, overdrying is also to be avoided, as this renders the material very brittle and difficult to work. A certain minimum of moisture is a naturally inherent ingredient in properly seasoned casein solids.

Testing

If the casein solids still smell strongly of formaldehyde after the drying, it is an indication that the drying has not been properly done, or that the hardening solution was too strong. This difficulty can usually be overcome by a proper rinsing of the material after it comes from the hardening bath and before it is dried.

Drying Time

The better grades of casein will withstand more variations in drying procedure than the inferior grades. The proper drying time for 2 mm. plates is about from 4 to 6 days; for 4 mm. plates from 14 to 16 days; and still longer for heavier materials.

Quite recently a method of shortening the drying, without deleterious effects, has been discovered; and it is now possible to dry casein solids of 2 mm. thickness in 3 days; and 4 mm. stock in 8 days; both periods inclusive of the preliminary drying time. Even these figures may be exceeded before long.

Methods for determining the state of drying, and the completion of the operation, are available. One way of doing it is to determine the loss in weight, and the constancy of the weight over two successive weighings. Micrometer measurements, to determine the shrinkage, are also good indicators of the degree of drying, as properly prepared casein solids shrink about 10% on drying. Experienced operators can also tell the properly dried material from improperly dried material by the sound given off when a sheet is rapped with the knuckle.

The manifold uses of the casein solids are well illustrated by the array of useful and ornamental articles in the above picture.
(Courtesy Karolith Corp.)

The operators that convey the material to the drying chambers, and service the same, must be provided with well-fitting and efficient gas masks, as the formaldehyde is very deleterious to health. For this reason, also, it is imperative that the hardening baths and the drying chambers be located in separate parts of the plant, properly partitioned; or preferably in a separate building. The protection of the workmen is an important feature of casein solids manufacture, and must not be neglected to their detriment.

Straightening

The warping occasioned by drying casein solids rods is taken care of by employing special types of straightening machines, as already described in an earlier article of this series. Plates which have lost their flatness, or have become otherwise distorted, are straightened in hydraulic presses, as already described. If the warping is so excessive that the plate can not be placed in the press, the plate is moistened with water to render it pliable. The pressure required for straightening is low. The press, after being charged with the plates that are to be straightened, is heated to 80°C, the pressure is applied, and the press allowed to cool while under pressure. The entire operation takes about 10 minutes.

Properties

These operations complete the manufacture of the casein solids; as far as sheets, tubes and rods are concerned. The steps that follow belong to the fabrication operations, which form a separate chapter. However, some of the outstanding properties and characteristics of the casein solids require to be described at this point.

Casein solids, when immersed in water, absorb about 32% of moisture. The specific gravity of pure casein solids, that is to say without fillers, is about 1.31. Casein solids in their air dry

(Continued on page 610)

Curing Molded Products Under Hydrostatic Pressure in Molten Cumar Resin

Novel method described by M. F. S. Smith in patent recently granted to him for a molding process

A NOVEL and very interesting process is that described by M. F. S. Smith, of Brooklyn, N. Y., in a recent patent granted to him and assigned to the Products Protection Corporation, of New York. (U. S. P. 1,627,209; May 3, 1927; application filed July 29, 1924.)

The process is one of molding, and cures partially hardened phenol condensation products under hydrostatic pressure produced in a specially constructed press in which a molten inert resin, such as a cumarone resin (Cumar) is used in the molten state to apply pressure to the objects to be molded.

Problems Met

The problems that had to be overcome, and the details of the method are very clearly disclosed, and as the method pursued is quite a departure from regular molding practice it should interest the producers of molded insulation to a considerable degree. While Mr. Smith's patent is quite long and full of detail as regards the apparatus employed, we have herein condensed the same and pointed out the salient features.

The general object of the invention is to provide both a novel apparatus for producing molded articles of phenolic condensation product suitable for use for the various purposes for which such product is adapted; for example, high voltage terminals for electric transformers.

Gas Tight Terminals

In use such terminals are subjected to high internal gas pressure, the said pressure being on the order of fifteen (15) atmospheres per square inch. It is essential, therefore, that the tensile strength and density of the said terminals shall be as great as possible. Likewise the dielectric strength also should be as high as possible and the external surface resistively is of especial importance for outdoor operation. The material usually employed for molding such terminals consists of wood flour impregnated with phenolic condensation product. The frictional resistance of such mixture to flow within a mold is great even at the optimum molding temperature employed.

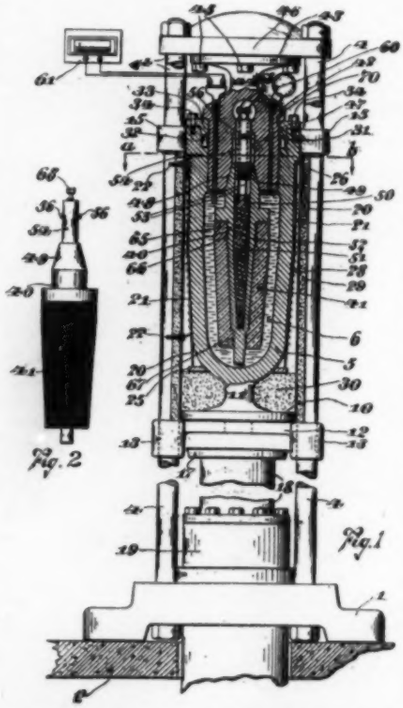


Fig. 1 and 2 showing apparatus employed in process, described by Mr. Smith.

In practice all moldings of these materials made in mechanical molds are of hetrogeneous density. Usually the larger the molding, that is the thicker the walls, the less uniform is the density. Such nonuniformity of density is especially apparent in large articles or moldings—for instance articles or moldings of the order of ten (10) pounds and of the configuration illustrated in the drawings of this application. By a mechanical mold is meant one in which the molding material is compressed and caused to flow by one or more plungers movable relatively to the chase of the mold.

Preheating

In the carrying out of the method embodying the present invention the mixture of wood flour and phenolic condensation product, in the still soluble and fusible form A, is subjected first to a drying and preheating process. The mixture having been subjected to a drying and a preheating treatment at a temperature below its transition point, a little below 80° C., it is then packed or rammed into a mechanical mold which is closed by means of an hydraulic press, and the material partially cured therein. The period of such partial curing depends primarily upon the wall thickness of the molding. A molding having a wall an inch in thickness should be kept in the mold for partial curing around ten minutes. The curing should be effected from the inside of the mold outwardly. This may be accomplished by providing that the mandrel within and upon which the molding is formed may be heated to a higher temperature than the external portion or chase of the mold. After the mixture has been placed in the mold, as above described, the temperature is raised to a temperature sufficient to transform product A to product C, say on the order of 140°

After the molding has been partially cured in the mold in which it is formed it is removed with the mandrel and quickly

(*Continued on page 602*)

Curing in Cumar Resin

(*Continued from page 598*)

(to avoid temperature drop) placed within a liquid which preferably should be chemically neutral with respect to the material of which the molding is composed and of greater viscosity than water. It is desirable that the liquid used should be relatively viscous as otherwise it would tend to seep in between the mandrel and the product under treatment as will be apparent in the following. It is essential that this material should be a liquid at the temperature of treatment and a solid at normal atmospheric temperatures at which the finished product is to be used. Such liquid preferably consists of "cumar," a dielectric, which is a synthetic resin produced from coal tar distillates. Chemically it is a mixture of para-coumarone, paraindene and the polymers of other hydrocarbons found in coal tar. At normal atmospheric temperature "cumar" is a solid but at the temperature at which the curing is effected, one hundred and forty (140) degrees centigrade or higher, the said substance is a liquid of sufficient viscosity. Instead of "cumar" chlorinated naphthalene (known in the trade as "halowax") also a dielectric may be employed.

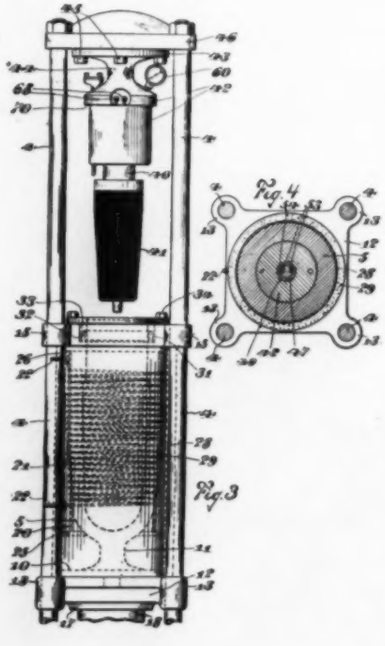
Procedure

Whether the one or the other of these substances is employed the said substance is placed in a receptacle of the static press and when melted the molding with the mandrel upon which it is molded and carried in its original relative position is inserted and supported within the receptacle of said static press, the said molding being submerged in the hot liquid. The said liquid is then very quickly subjected to a static pressure on the order of one ton per square inch. The static pressure must be applied quickly otherwise the liquid will seep in between the mandrel and the product under treatment. By the use of this viscous liquid and by a quick application of the static pressure, the use of the rubber or other packing usual in hydrostatic pressing of materials is eliminated. The molding is left in this liquid under pressure and at a temperature of around one hundred and forty (140) degrees centigrade or higher until the curing is effected.

Other Fusible Materials May Be Used

It should be understood that any other relatively viscous liquid suitable which is chemically neutral with respect to the material of the molding may be employed.

The liquid employed, however, preferably should be one of such character that it will combine mechanically with the external surface of the molding and it should preferably be of such character that the surface resistivity of the molding will be increased by the incorporation of the outer portion of the molding with portions of the material within which the curing is effected. The extent to which the liquid within which the curing is effected may penetrate the molding may be controlled by the extent of the curing of the said molding within the mechanical mold before subjecting the same to the action of the liquid under static pressure, as above described.



Figs. 3 and 4 of Mr. Smith's recent patent on a novel method of curing phenol resins.

The mechanical bond which is effected during the curing operation between the molding material and the "cumar" appears to be lasting. The resultant surface is speckled, that is, there are many small isolated specks of "cumar" which add greatly to the surface resistivity and tend to prevent wetting of the molded article when it is subjected to the weather. The surface in that respect has somewhat the characteristic of a wax.

Advantages

A further advantage incident to the use of "cumar" as the material in which the curing is effected is that it is a completely polymerized substance which is a desirable characteristic of the material employed in the curing process of a molded phenolic condensation product.

The machine or apparatus employed is believed to be novel but it will be understood that the method may be carried out by the use of any apparatus or machine which may be suitable and adapted to that end.

Apparatus Used

Fig. 1 is a view partly in vertical central section and partly in side elevation of a static press adapted for the curing of phenolic condensation products;

Fig. 2 is a view in side elevation of a molding carried by a mandrel such mandrel being the interior member of the mechanical mold;

Fig. 3 is a view in side elevation of the static press with the parts in different positions from that shown in Fig. 1; and

Fig. 4 is a transverse sectional view taken on the line *a*—*b* of Fig. 1.

(*Contiued on page 618*)

It is proving itself by results . . .

CELORON Molding Powder has proven its quality in the finished products that have been molded from it.

Celoron Molding Powder has proven its economy in the plants where it has been adopted.

Extravagant claims are unnecessary.

You are the best judge of the molding powder most suitable to your requirements. Send for a sample quantity of Celoron Molding Powder and test it out in your own plant, in your own molds — side by side with any other molding powder you are now using. And ask us for quotations.

THE CELORON COMPANY, Bridgeport, Pennsylvania
Division of Diamond State Fibre Company In Canada: 350 Eastern Avenue, Toronto

CELORON
MOLDING PRODUCTS

Molding Powders — Impregnated Fabrics and Paper for Molding

Also

Laminated Products and Resins for Electrical and Industrial Purposes—Celoron Silent Gears

EDITORIAL · IMPRESSIONS

The Problems of the Pioneer

In every field of human endeavor; and especially in the industrial domain, the pioneers who give the world a new product; or a new service, are sooner or later confronted with a real and vital problem. This is the proper protection of the name of the product they have given to the world.

Despite more or less beneficent trade-mark and unfair competition laws, the trade name of a popular product soon begins to be applied to other, similar, or only analogous products. Though the owners of such trade names do everything in their power to prevent improper use of their name; they fail utterly to prevent the "public at large" from the general use, or misuse of such names. Finally it may even be necessary for those who gave a product to the world to relinquish the name for general purposes, and to coin and protect a new name to identify their particular product.

Trade Names

The plastics industry has been particularly troubled with this problem. For forty years *Celluloid* was the exclusive possession of the company that originated it; but it is safe to say today that the same word can be found in every dictionary, both English and foreign. In other words, *celluloid* (without the capital C) means pyroxylin plastics in general. The adoption of the mark "Amerith" by the originators of Celluloid, is one answer to the problem. In a lesser degree casein solids are spoken of as Galalith by the buyers and fabricators of this material.

A similar tendency is now making itself felt in the phenoplastic field. The public, who is the final arbiter after all, is beginning to call any smooth, hard, polished, hard-rubber resembling molded product by the term "Bakelite"; irrespective of its origin. In one sense this helps the popularization of the phenol resins; and of the prosperity of the originators of this valuable material; but it is also permitting plastic molders to call material "Bakelite" that most decidedly is NOT real Bakelite. As the modern phenol resins differ hardly at all in their exterior appearance, such deception is easy.

It is with no sense of disparagement of other products that we say this; and we are fully aware of the responsibility that we assume by bringing up this problem. The makers of other plastic products, as *Durez, Durite, Kellite, Colasta, Textolite* and many others, are all doing their best to get the users of their products to call their molded goods as "being made of Durez" (or whatever material it may be); but many of the molders are calling all of them "Bakelite"; and their customers acquiesce in this.

What is urgently needed, is a generic term to cover these products. The public would have to be educated up to this term; or else the name *Bakelite* must be allowed to become the general name; as *Celluloid* has in the pyroxylin field.

The adoption, on the part of the Bakelite Corporation, of a new trade mark, the B within the trefoil and the infinity mark below, may be a sign that the originators of this product feel somewhat the way we do about it. In Europe, the word bakelite (with a small b) is already being used as a general term.

We would warmly welcome a free discussion and debate on this problem; as it is a timely and exceedingly important one. Interested readers are invited to contribute their remarks; may they be bouquets, or brickbats.

* * * * *

Fundamental Research

THE leading article of the present issue of PLASTICS concerns itself with some of the fundamental colloid chemical problems of plastics.

Most of the work in the past, in the field of plastic materials, has been along the line of discovery of new compounds; and of mixtures of various materials that aimed, more or less empirically, to solve the particular problem confronting the investigator in this province.

The secrecy with which this work was surrounded checked progress considerably; as it was necessary for each worker to wade through the multitudinous difficulties that beset him at each new turn; and he could get no information as to the trend of development followed by others.

Each organization that exploited a particular product, such as a new synthetic resin, a perfected casein solid; or a non-inflammable cellulose plastic, kept all pertinent information locked up in the secret compartments of their archives; and only occasionally did some research worker have the temerity to disobey the injunction of his employers and to publish at least some of the results of his work.

In Europe, where patent applications soon become public, the matter was somewhat different; and the progress of any particular art could be followed without much difficulty and de-

lay. In America, however, with our secret patent applications, a product might be on the actual market for five or even ten years before the details of its manufacture became known by the issuance of a patent thereon. Furthermore, such patents then had a full seventeen years to run; so that the actual protection in some cases might be for a quarter of a century.

Patent Procedure Speeded

However, things are beginning to change in this respect. The procedure of the U. S. Patent Office has been speeded up about one hundred percent by new rules recently promulgated, and the "burial" of applications by dilatory patent prosecution has been rendered more difficult.

Moreover, some of the "fundamental" or "basic" patents in the plastics industry have expired, and competition at present is rather along the lines of attempts to cheapen production costs; and in the rendering of "service" to the consumer.

Surface Only Scratched

It must not be forgotten, however, that despite the large fund of information available today, that the surface of this field has only been scratched; and it is safe to predict that the progress in the next decade will by far exceed anything that has transpired to date; and that the public will be offered products that have properties that at present are only possessed by such things "as dreams are made of".

Such fundamental conceptions as shown by the writers of the article referred to, will advance considerably our ideas on the real nature of a thermoplastic material; and if these ideas are utilized, much progress in the production of plastics of definite properties becomes possible.

We are equally certain, that similar work is being done in our own country; but, it seems, behind sealed doors.

Molded Dishes from New Synthetic Resin

Bright and Brilliant Colors, Non-breakability; light weight and novel designs characterize novel product

By A. C. Blackall
British Correspondent of Plastics

BANDALASTA ware, Beacon ware, Endura ware, Birmite, Beetle ware, and a number of other molded materials are now being produced in the United Kingdom from the molding powders produced by the Beetle Products Company of Oldbury, Worcestershire. These powders are sold to the various manufacturers of the above and other molded materials, the Beetle Company not being personally interested, except for experimental purposes, in the actual molding of its powders.

Non-Phenolic

These powders are a non-phenolic condensation product, being made from a non-phenolic synthetic resin. The resin is colorless and no coal tar product whatever is used in its manufacture. The resin, in conjunction with suitable fillers, produces the molding powders and laminated sheets.

The powders can be produced in any color, in white and black and in colors in which phenol resins cannot be produced. The range already available includes many beautiful translucent shades. By introducing to the molding trade the possibility of reproducing artistic shapes in delicate shades and colors, these Beetle powders open up a wide field previously untouched.

Non-inflammable

These molded articles possess the advantage of being fast to light, of being non-inflammable, of remaining hard and unaltered when washed in boiling water, and of being unaffected by prolonged immersion in cold water. The resistance of articles molded from these powders to the absorption of water is pronounced, and permits of the manufacture in beautiful colors of such articles of utility as cups, saucers, plates, knife handles and tableware of all kinds, ash trays, cigarette cases and brush backs. The natural shade of Beetle ware is ivory. The white and cream shades are quite unique and provide a valuable contribution to the problem of non-metallic fillings for public institutions and domestic furnishings. Moreover, the unbreakable quality of the tableware makes it especially suitable for asylums and houses of detention. (Another outlet would seem to be crockery for use on shipboard—Editor.)

A colorful selection of table ware molded from a non-phenolic synthetic resin.

A point of great importance to those engaged in cutting fancy articles from sheet is the elimination of the heavy cost incurred in machining such articles because these powders permit of their being molded direct into moldable shape.

Just Like Ivory

The fact that laminated sheet can be produced in any color, and that the light-colored sheet is translucent, opens up another new field of development. As stated, the natural undyed sheet somewhat resembled old ivory and is thus well suited to the production of labels of all kinds. To these can be added the particularly beautiful decorative effect given by making water-colored drawings or prints more permanent against the ravages of time. These signs, labels, drawings, etc., are stated to be very serviceable for zoological, horticultural, or museum purposes, and a large outlet is opened for miscellaneous show signs and other advertising media.

Marbled Effects

Those familiar with the building trade will readily recognize that there is an immense advantage in being able to produce molded articles in any color to match or blend with tiles and panels. Marbled and similar effects can be reproduced on door handles just as easily as they can upon walls. Switch covers and finger plates can be matched in the shades through which electric light is diffused into the room, and the colors can be shaded one into the other to meet the most fastidious taste. The result is one harmonious whole which is clean, antiseptic, and undamaged by ordinary usage.

It will be of value to give a brief account of the plant required and the methods of operating it to produce perfect moldings from "Beetle" powders. The powders are molded under conditions of heat and pressure, and to obtain these conditions a hydraulic press, preferably fitted with steam-heated platens, is required. It is essential that uniform temperature conditions are maintained when molding these delicate colors. Overheating has the effect of lightening the shade of color and underheating has the reverse effect.

In order to control the temperature the steam inlets and outlets to the press should be arranged to have a continuous fall and so avoid any accumulation of condensate. The pressure should be controlled by an efficient reducing valve.

Molding With "Beetle" Powder

The powders should be molded at a temperature ranging from 140 degrees Centigrade to 145 degrees Centigrade, represented by 50 lbs. per square inch of steam pressure on the platens of the press. They require a pressure of 1,500 to 3,000 pounds per square inch. The higher pressure is required for molds of complicated shape.

The curing time varies from three to seven minutes, depending upon the size and shape of the article. When properly cured the molding should be ejected hot and requires no further treatment.

The powders produce the best results when molded in dies of the "flash" type. Dies made from either stainless steel, or a good quality alloy steel, which should be hardened and highly polished, are recommended. Stainless steel dies, however, are preferable.

Articles molded from these powders should be washed in soap and hot water, but care should be taken, as in the case of aluminum articles, not to use washing soda or soap powders containing strong alkalies, otherwise the delicate coloring may be impaired or the surface roughened. On the other hand, bowls and similar pieces may be cleaned quite readily with liquid metal polish or rubbed with furniture cream.

For the information contained in this articles, the writer is indebted to Cyril S. Dingley, sales manager of the Beetle Products Company, from whom it was obtained in an interview.

Another New Aminoplastic

Condensing urea and formaldehyde in presence of glycerol gives superior product

THE Rohm & Haas Co., who already control the well-known Johns patent on the urea-formaldehyde condensation products, having acquired the rights thereto through Mr. Felix Lauter some years ago, have also become the assignors to a recent patent U. S. P. 1,633,337; of Felix Lauter, issued June 21, 1927.

Some of the difficulties encountered with the earlier products are said to be overcome, and one of the new features is the condensation of the ingredients in the presence of a polyhydric alcohol such as glycerol. An alternative step is the use of commercial solvents such as alcohol, benzene, toluene, acetone, carbon tetrachloride or the like in place of water, in carrying out the condensation.

Apparently, the product has some similarity to what has become known as Organic Glass, or Pollopas.

Use of Glycerol

The use of glycerol or other polyhydric alcohol as a medium in the presence of which the carbamide and formaldehyde are condensed, not only serves to render the final product water-proof, but also assists in making it flexible, thus enabling the production of a reaction product which can be used for photographic films and many other purposes. It is recognized that glycerol has frequently been suggested as a material to be added to resinous substances of the general character here described, but heretofore it has been added after the first reaction has taken place and a resinous body has been formed. By having the glycerol or other polyhydric alcohol present at the time of the original reaction, a new effect is obtained. It may be that the result is due to the fact that there is a mixture of two colloids and that the glycerol serves as a dispersing agent surrounding and protecting each molecule of the resin.

Optimum Conditions

The best results so far secured are by using 2.7 molecules of formaldehyde to each molecule of urea and an additional molecule of formaldehyde for each molecule of glycerol; however, the proportion of glycerol used should be such that not more than 1.2 molecules of the same are used for one molecule of urea. These proportions are not, however, absolute, but they may be modified to suit the wishes of the operator.

The condensation may be carried on without the addition of any condensing agents, but it is preferred to use either an acid or an alkaline condensing agent, or under certain conditions to use first one and then the other. The material, after the preliminary condensation, may be molded or cast into desired form and then hardened under heat, with pressure if desired, or the intermediate product may be used as a water-proof lacquer or varnish.

For the purposes of illustration several examples are given.

Exampe 1—399 grams of commercial solution of formaldehyde are heated to boiling point and a solution of 30 grams of

(*Continued on page 610*)

TECHNICAL ABSTRACTS
AND PATENT REVIEW

Molding Light Weight Composition Products. William J. Gaven, (deceased), Wilkes-Barre, Pa., U. S. P., 1,628,400; May 10, 1927. (Mary E. Gaven, administratix).

The articles, which may be hollow or floating objects such as doll-heads, decoy ducks, canoes, radio parts, etc., comprise a central core of light weight material and a molded covering based on a shellac plastic composed of 1 lb. wax, 1 lb. earth, 2 lbs. china clay and 1 lb. shellac fused together under heat and then ground and sifted into powder. The interior composition may consist of three pounds of pulp (wood pulp?), two pounds of flour, and two and one half pounds of resin, dampened with two parts of water. The mixture is molded hot, covered with the powder above described and again heated in a mold, forming a waterproof outer covering.

Sulfur-phenol resins. Carleton Ellis, Montclair, N. J., U. S. P. 1,636,596; July 19, 1927.

Phenol or similar organic material is condensed with elemental sulfur in the presence of an alkaline catalyst; hydrogen sulfide being a byproduct. The resin produced may be used for hot molding, using the usual fillers. The hardness of the product may be increased by addition of small amounts of hexamethylenetetramine. The process comprises making a resinous product by heating a mixture containing sulfur, a phenolic substance and an alkaline material to substantially over 150°C. the amount of sulfur being about 4.5 to 6 atoms of sulfur to 1 molecule of the phenolic body.

Non-flammable Pyroxylin Plastic. William G. Lindsay, Newark, N. J., assignor to The Celluloid Co., U. S. P. 1,630,752; May 31, 1927.

Cellulose nitrate is incorporated with an organic phosphate such as triphenylyphosphate or tricresyl phosphate, with the further addition of a flame extinguishing material such as hexachlorethane (C_2Cl_6). The material is said to be noninflammable. Cellulose acetate may replace the cellulose nitrate, the first claim calling for a cellulose ester, an aromatic phosphate in close association with hexachlorethane.

Coloring horn, leather, etc. Fr. Ullman, Kunststoffe, 1927, **17**, 153.

Directions are given for dyeing and coloring leather and horn by means of various organic dyestuffs.

Carbohydrate Ether Plastics. Leon Lilienfeld, Vienna, Austria. U. S. P., 1,625,416; April 19, 1927; application filed Jan. 9, 1926, and in Austria May 15, 1920.

Relates to plasticizing agents for alkyl and aralkyl ethers of cellulose. These are oils which are derived from naphtha by a process somewhat like that used in making coumarone resins, and are prepared by treating solvent naphtha with sulfuric acid. The more volatile products such as those boiling up to 180°C are boiled off, and the residual substances are distilled in a vacuum. The fractions coming over at from 180 to 300°C in vacuum are the plasticizers used. These oils are water-white to light-yellow in color, the more viscous oils having a blue fluorescence.

In making pyroxylin plastic type of material 25 to 50 kilograms of one of the oils is added to from 75 to 120 kilograms of a water-insoluble ethyl cellulose or ethyl starch or benzyl starch, optionally together with another solvent for the carbohydrate ether, and the mixture is then treated in the usual manner for the manufacture of celluloid-like masses and products.

Formulas are also given for the making of artificial leather, insulating material for cables and the like. According to the relative amounts of the carbohydrate ethers and the new oily plasticizers the products vary from materials as soft as rubber to hard plastics like horn or celluloid.

Reducing the Viscocity of Cellulose Ethers... Paul C. Seel, assignor to Eastman Kodak Co., Rochester, N. Y., U. S. P. 1,635,031; July 5, 1927.

A cellulose ether, such as ethyl cellulose, of high viscosity when dissolved in solvents, usually in a mixture of equal parts of benzene and ethyl alcohol, producing a heavy molasses-like dope. This dope has a very slight acidity, approximately equivalent to an hydrogenion concentration of pH 5.0. Film is made from this dope on the usual type of film-machine, and the film is stored or "incubated" as the patent calls it at preferably 65°C for a period of time which may range from days up to months. The film is tested for viscosity from time to time, and when found desirable is dissolved in the solvent already mentioned. The solutions thus obtained are low in viscosity and may be sprayed upon objects like lacquer, and will form excellent coatings or films of good flexibility.

Production of films, filaments, etc., from cellulose esters. Louis Clement and Clery Riviere, Pantin, France; assignors of one-half to Courtaulds, Ltd., London, England. U. S. P. 1,634,980; July 5, 1927.

Filaments, films, etc., can be made from solutions of cellulose esters such as cellulose acetate, nitro-cellulose acetate, or nitro-cellulose by squirting such solutions through suitably shaped orifices into a saponifiable animal or vegetable oil as castor oil, linseed oil, etc. The cellulose ester will be precipitated in film form in highly transparent condition, and the oil is removed in any suitable manner. If the process is used for production of Rayon (artificial silk) the product is said to be very lustrous and soft.

Cellulose Acetate, and Process of Making the Same. Richard Baybutt and Edward S. Farrow, assignors to Eastman Kodak Co., Rochester, N. Y. U. S. P. 1,635,026; July 5, 1927.

Chloroform-soluble cellulose acetate powder produced by spray-drying is treated with an acid such as a 10% solution of nitric acid, until the powder becomes soluble in acetone. The solubility can be controlled, and is tested by the use of a polariscope, using mercury green light. The desired product when dissolved in acetone shows a specific rotation of minus 2 to minus 5 (i. e. levo-rotatory).

Natural and artificial lacquer and varnish resins. E. O. Rasser; Kunststoffe, 1927, **17**, 127, 160 and 183.

This article is an excellent resume of our present knowledge of the resins employed in varnish and lacquer manufacture and the efforts that have been made to synthesize useable substitutes. The natural resins described include the various types of Dammar resins and their solvents. Among the artificial resins taken up in detail are the cumarone resins (Cumar), the various phenol resins, furfural condensation products, acrolein resins and naphthalene formaldehyde products. Another part of the article deals with the copals and Manila copals.

Stamping Press for Zyl Articles. Fritz Clausner, Kunststoffe, 1927, **17**, 140.

Description of an automatically fed and electrically heated stamping press for use with "roll leaf" for stamping on zyl and similar plastics.

Manufacture of Zyl Boxes. A. Bahls, Kunststoffe, 1927, **17**, 129.

The fabrication of zyl boxes and articles having a rectangular shape is described and illustrated. Machinery used in Germany for this purpose is also illustrated.

British Phenol Resin Patents. (1919 to date). Dr. Aladin, Kunststoffe, 1927, **17**, 136, 157.

This is a continuation of the author's excellent concise resume of the recent patents on phenol resins. The earlier articles reviewed the German and American patents, the present issue gives details regarding the British patents.

The Solubility of Collodion Cotton (Pyroxylin) in Alcohol. E. von Mühlendahl and J. Reitstötter, Kunststoffe, 1927, **17**, 151.

The article discusses the anomalies in the alcohol-solubility of pyroxylin, which was found to vary widely depending upon the amount of material that was used for the experiments. For example, when 0.125 grams of pyroxylin were treated with 75 cubic centimeters of alcohol (96%), 61.9% were dissolved; but when the same amount of alcohol was allowed to act on 10.000 grams of the same pyroxylin only 47.3% dissolved. Two hours in every case were sufficient for the establishment of equilibrium conditions. A suggested method for testing the alcohol solubility of pyroxylin that is to be employed for zyl production is given, as follows:

0.5 gram of the pyroxylin, dried to constant weight at 45°C. is placed into a test tube 35 centimeters long and 2 cm. inside diameter, and covered with 75 cc. of 96% ethyl alcohol. The tube is then closed and the contents shaken for 2 hours at 18°C. It is then placed upright and allowed to stand undisturbed for 5 hours. The undissolved material settles out, and thereupon 25 cc. of the clear supernatant liquid are pipetted off and placed in a tared glass evaporating dish. The dish and solution are heated at 50°C. until the residue no longer smells of alcohol and is then dried to constant weight at 100°C. The weight of the residue, multiplied by 600, gives the percentage of soluble material in the pyroxylin tested.

Blood Plastics. Emil J. Fischer, Kunststoffe, 1927, **17**, 173.

Various artificial products, mainly along the line of adhesives and cements are described as made from blood and blood albumen. The German patents on the subject are the basis for the short article.

French Patents on Phenol Resins. Dr. Aladin, Kunststoffe, 1927, **17**, 185.

A further continuation of the author's resumé of the patent literature of the phenol resins, from 1921 up. The methods of preparation, according to the patents, are given in concise outline. The **patents of Holland** are also listed and discussed.

Copies of any U. S. Patent reviewed in our pages can be procured for 10 cents from the U. S. Patent Office at Washington, D. C. (cash).

New Urea Resin

(*Continued from page 607*)

glycerine and 100 grams of urea are added; then 2 cc. of concentrated nitric acid (HNO_3) are incorporated and boiled until condensation takes place. After the condensation, 20 cc. of ammonium hydroxide (NH_4OH) are added and boiled until the material will harden on cooling. The product separated from residual water is shaped and dried at a temperature of about 60° which may gradually be increased to about 125° if necessary. The resulting product will be found to be water white, insoluble in water or alcohol, strong and flexible. Among other uses, it will be found useful for photographic and optical purposes.

This product, combining the two features, is particularly advantageous for use as a strong and flexible material, similar to celluloid, which can be stamped out cold or which can, in a liquid state, be used as a lacquer or varnish for metal. After hardening with heat, the lacquer will stand a considerable amount of bending and stamping without breaking off from the metal.

The Manufacture of Casein Solids

(*Continued from page 597*)

natural state contain about 8 to 10% of moisture.

The hardness of casein solids is a little lower than that of spathite, or about 2.5 on the Moh scale. The hardness of the pyroxylin plastics is a little lower than this, or about 2.0, as these can even be scratched by gypsum. Both casein solids and pyroxylin plastics are easily worked with a saw or on a lathe, the casein being harder. The casein solids are capable of taking an excellent polish, and will exhibit a much greater gloss than pyroxylin. The latter, however, is very much more flexible and elastic.

Fats, oils, gasolene, etc., as well as dilute acids, have practically no effect on casein solids. When highly heated, casein solids will char and swell up, and will give off a penetrating odor similar to that produced when burning horn. This sharply differentiates the casein solids from the pyroxylin plastics, as the latter instantly break into a violent flame when ignited, and continue to burn with a strong odor of camphor. The nonflammability of the casein solids, together with their excellent insulating properties, assures them of a very important part on the plastics industry of the future.

Final Form

As offered to the trade, the casein solids rods, tubes and plates are furnished in the unpolished state. Plates usually are 40x50 centimeters; and the robs and tubes about 100 centimeters long; although many plants furnish special sizes on demand. Natural, or uncolored and unfilled casein solids are termed "blonde". Various mottled and partially transparent effects, such as imitations of buffalo horn, tortoise shell and the like; pearl effects, etc., are obtainable. The production of special colors and effects will be taken up in future articles of the present series.

It is contemplated that the series of articles by Mr. Prehn will eventually be published in book form, together with additional information that is now being gathered. This book will contain many highly valuable actual formulae that have never been available before. Publication will be by subscription, and the book will in all probability not be offered to the general public. Interested parties are requested to communicate with us for details and advance information.

Recent Advances in Cellulose Esters

(*Continued on page 595*)

may be gained from the following table showing the relative proportions of combined fatty acids which are present in coconut oil:

	Per Cent.
Caproic ($C_6H_{12}O_2$)	0.25
Caprylic ($C_8H_{16}O_2$)	0.25
Capric ($C_{10}H_{20}O_2$)	19.5
Lauric ($C_{12}H_{24}O_2$)	40.0
Myristic ($C_{14}H_{28}O_2$)	24.0
Palmitic ($C_{10}H_{32}O_2$)	10.6
Oleic ($C_{18}H_{34}O_2$)	5.4

Higher Acetyl Derivatives

A decidedly greater lowering of the freezing point and increase in solvent power of the higher fatty acid glycerides is attained by introducing two, instead of merely one, acetyl group into the glyceride molecules. My new class of softeners includes broadly both the monoacetyl - di - acyl - glycerides and the diacetyl-mono-acyl-glycerides, where "acyl" is used to mean the acid radical of a higher fatty acid, as well as corresponding glycerides containing one or two formyl, or one or two propionyl, groups. These new softeners may be designated briefly as "mixed glycerides."

Softener Superior to Castor Oil

This mixed glyceride is a more effective softener for pyroxylin than is castor oil, as is indicated by the fact that a film containing pyroxylin 1 part —mixed glycerides 1 part, has about the same pliability as a film containing pyroxylin 1 part —castor oil 1.5 parts. The mixed glyceride can be used alone with nitrocellulose if the ratio of said mixed glyceride to nitrocellulose is low enough. However for fabric-coating compositions it gives the best results when mixed with a lubricant such as mineral oil or esters of aliphatic alcohols with the higher fatty saturated acids such as stearic.

The following is a sample coating composition without a lubricant.

	Parts
Pyroxylin	1.00
Mixed glyceride	1.37
Pigment	0.62
Volatile solvent	11.00

The following is a sample coating composition with a lubricant.

	Parts
Pyroxylin	1.00
Mixed glyceride	1.34
Liquid petrolatum	0.15
Pigment	0.62
Volatile solvent	11.00

The ratio of mixed glyceride or a mixture of these mixed glycerides and lubricant to pyroxylin in films containing pigment can be varied from pyroxylin 1.00—softener 0.75 to pyroxylin 1.00—softener 1.62. In films containing no pigment the ratios can be varied between pyroxylin 1.00—softener 1.62 to pyroxylin 1.00—softener 1.25. High ratios of softener tend to produce films too soft or sticky for good embossing and low ratios tend to produce stiff material.

Solvents Used

As the volatile solvent in the above formulas there may be used a mixture containing benzene 38% and ethyl acetate 62%, or a mixture containing benzene 50%, ethyl acetate 25% and denatured alcohol 25%. Many solvent mixtures other than these two may of course be used. For example, as the active solvent there may be used either acetone, acetone oils, methylacetone (a commercial mixture containing methyl, acetate, methyl alcohol, and acetone,) or an ether-alcohol mixture; and as the diluent there may be used, for example, ethyl alcohol, benzine or benzol.

The ratio of volatile solvent to non-volatile constituents may of course vary widely; thus, instead of the 11 to 3 ratio in the above formulas, the ratio of volatile solvent to nonvolatile constituents may, for example, be 18 to 3 or 21 to 3.

Coating Compositions

As indicated above the new

nitrocellulose composition containing a mixed glyceride as the softener is especially advantageous when applied to fabrics in the manufacture of artificial leather (fabrikoid, etc.). Artifiicial leather containing the new nitrocellulose composition is free from the objectionable odor of castor oil, and is remarkablly pliable and durable.

When working with cellulose acetate the acetyl-laurins should be used in conjunction with another solvent softener such as triacetin.

Where the coating composition is to be applied by calendering, and is in the form of a plastic mass, the ratio of volatile solvent to non-volatile constituents may be as little as 1 to 3.

Although the mixed glycerides of higher and lower fatty acids are especially applicable as softeners of nitrocellulose in connection with the manufacture of artificial leather, they are also valuable softeners or modifiers of nitrocellulose in all of the pyroxylin industries. For example, acetyl-laurins can be used as a softener in pyroxylin lacquers and enamels where it has been customary, in the past, to use castor oil. The quality of the lacquers and enamels is much improved by the use of the new softener because it is not subject to oxidation as is castor oil. Acetyl-laurin may also be used as a camphor substitute in the manufacture of celluloid; it has the advantage over camphor that the product is softer and less liable to discoloration when exposed to sunlight. In fact, in any of the pyroxylin industries, where a softener or modifier has been used, the new products described will find valuable application.

Reducing Viscosity

The second patent deals with methods for reducing the viscosity of cellulose nitrate solutions, a field in which a great deal of work has recently been done. Earle C. Pitman, of Parlin, N. J., invented the present process, and says that:

"I have discovered that cer-

tain salts, and particularly the acetates of the alkali-forming metals such as sodium acetate and calcium acetate, have a remarkable effect on the viscosity of nitrocellulose (pyroxylin) solutions which have not previously been treated with said salts. Only a small amount, for example 0.1%, of the salt, based upon the weight of the solution, is required to bring about a substantial reduction in viscosity.

The reduction of viscosity according to my invention is effected by incorporating the salt in the nitrocellulose solution to form a homogeneous mixture, and then either allowing the mixture to stand for several days at room temperature, that is, between about 22 and 25° C., or mildly heating the mixture while preventing the escape of solvent.

The new process may be illustrated by the following example:

A pyroxylin solution is prepared having the following composition:

	Parts by weight
Pyroxylin	20
Camphor	3
Fusel oil	10
Wood alcohol	67

0.2 parts of sodium acetate are incorporated in the above-described solution, and the mixture is allowed to stand at room temperature (22° C.) for from 1 to 7 days depending upon the viscosity desired.

The extent of the reduction of viscosity of a nitrocellulose solution after being subjected to the action of a viscosity-reducing agent for various periods is indicated in the following table, giving results of the action at room temperature of 0.2% sodium acetate on pyroxylin solutions containing 12 to 18% pyroxylin, the viscosity being expressed in centipoises at 25° C.

Period (in days)	Viscosity			
Initially	15,000 cp.	15,000 cp.	6,300 cp.	5,000 cp.
1	10,000 cp.	3,000 cp.	.....	1,000 cp.
3	.....	.....	3,600 cp.	590 cp.
4	5,000 cp.	1,500 cp.	3,100 cp.	400 cp.
7	3,500 cp.	1,100 cp.	.....	.....
10	.....	.....	1,800 cp.	120 cp.
11	2,000 cp.	1,000 cp.	.....	.....
14	1,200 cp.	960 cp.	.....	.....
36	.....	920 cp.	.....	.....
40	1,000 cp.	.....	.....	.....
120	.....	.....	190 cp.	20 cp.
150	490 cp.	.....	.....	.....

The invention is not limited to the treatment of pyroxylin solutions with a single salt, but includes the combination of two or more different salts for reducing viscosity.

Recovery of Camphor

The third patent, U. S. P. 1,637,990; Aug. 2, 1927, covers a process for recovering camphor, gelatin and silver compounds from waste motion picture film, particularly from film stampings which result from the punching of the holes on each side of a cinema film. The inventors, Carleton Ellis and Harry M. Weber, say that they accomplish the desired results by treating the waste film with strong solutions of sodium hydroxide, sufficient heat being given off during the treatment that actual cooling is necessary. The process further contemplates the use of a camphor solvent that aids in the recovery of the camphor present.

Printing on Celluloid

(*Continued from page 595*)

heating the press and setting fire to the material. Presses heated with steam were next in line of development, but the most modern method is to employ electricity for heating the stamps and dies. This also allows of very accurate control of the temperature.

The first attempts at out and out printing upon celluloid were made with ordinary printing ink, the ink being rolled on the die and thus forced into the material when the pressure was applied. This procedure suffered from the great defect that the printing did not appear clean cut, but was somewhat ragged at the edges of the letters. This was caused by the lack of porosity of the celluloid, and for this reason the next attempts made employed a celluloid solvent, such as acetone, in the printing ink, in order to cause a penetration of the surface of the material, which would prevent the spreading of the ink.

The application of gold leaf, according to the older processes still employed by some manufacturers, was quite complicated. The gold leaf, either genuine or imitation, was cut into small pieces corresponding to the size of the impression that was to be made, laid upon the material to be impressed, and forced into contact with the same by a heated stamp.

In order to make the gold leaf adhere, however, it was necessary first to prepare the surface of the celluloid so as to render it adhesive. This was accomplished by rubbing the surface of it with a rag slightly dampened with alcohol, sprinkling on finely powdered albumen, or coating with an aqueous solution of albumen. As the heat of the die would insolubilize, or cook, the albumen, this would cause the adherence of the gold leaf.

Roll Leaf

At the beginning of the present century, the first socalled "printing foils" appeared. These, while originally confined to printing with gold and silver foil, gradually developed into foils suitable for impressing almost any imaginable color or effect. The material became known in America as "roll gold," "roll leaf," etc. This matrial consisted of a continuous web of suitably treated paper, usually coated with a secret composition, which would be released by heat from its support, but would adhere to the material being stamped upon. The early materials consisted of individual sheets, which had to be cut like the genuine gold foil, but the use of albumen powder was obviated.

One defect of all these methods, although they were greatly superior to the old hand methods, was the necessity of removing the excess of material from the articles. This had to be done by wiping or brushing, and caused a large waste of material and labor. However, the printing was very perfect and clean cut, and the adherence to the

celluloid so strong that the articles could be polished after having been decorated, thus enhancing the lustre and fine appearance of printing.

The latest development in this field is an automatic stamping machine that makes use of a roll of "gold leaf" or color foil, which mechanically feeds through the machine and between the dies and the work being impressed. The dies are electrically heated, the heat being accurately controlled for the best operating temperature. Each impression causes a certain portion of the material to be released from the paper base, and to adhere to the celluloid only at the points where the die strikes the material. There is no necessity for wiping or removing any excess of material, as the impressions are clear cut.

Molding Under Hydrostatic Pressure in Molten Resin

(*Concluded from page 602*)

In the operation of the apparatus and in the carrying out or practicing of the method the molding is first molded upon the mandrel 40, or a similar mandrel in a mechanical mold and given a preliminary curing treatment therein, as above described. In this preliminary curing operation the interior of the mold, that is to say, the mandrel should be at a higher temperature than the exterior mold member in order that the curing may proceed from the interior toward the exterior of the molding itself.

Final Curing

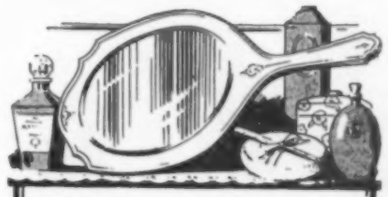
The preliminary curing having been completed the mandrel with the molding thereon as shown in Fig. 2 is transferred to an apparatus such as illustrated and is secured in place upon the stationary member 42 with the outer upper terminals 68 of the extensions 53 of the resistance wire 52 in contact or engagement with the line wires which

Accessories
For Toilet Articles

communicate with the source of electric current supply not shown. The exterior member 5 of the press having been previously supplied with a suitable material, such as "cumar" is heated, the "cumar" liquefied and maintained at the desired temperature. This material constitutes the liquid 6. The member 5 is then elevated by means of the plunger 18 so that the molding is submerged within the said liquid 6. By reason of the upward movement of the external member 5 of the press the stationary piston-like member 42 is caused to enter the upper end thereof, as shown in Fig. 1 of the drawings, so that the liquid 6 within the member 5 may be and is subjected to great pressure, the pressure being on the order of two thousand pounds per square inch. It may be noted here that the upward movement of the member 5 under the influence of the ram or piston 18 is adapted to be limited by the shoulder 70 near the upper end portion of the member 42.

The molding having been submerged within the liquid 6 is retained therein under the pressure indicated during the period that the curing is being effected which may be several hours, the length of time depending upon the thickness of the molding. The curing should be effected at a temperature on the order of 140 degrees. As already indicated, during the preliminary curing in the mechanical mold in and by which the molding is originally formed the temperature of the interior should be greater than that of the exterior in order that the curing or change of form may take place from the interior towards the exterior of the molding.

After the curing of the molding has been completed the ram or piston 18 is lowered so as to lower the external member of the mold structure. The mandrel 40 from the disengaged and removed from the stationary piston-like member 42 and while the molding 41 is still hot it is turned so as to remove or back it off of the mandrel 40. The molding is then cooled very slowly to room temperature.



Colloid Chemistry and Plastics

(*Continued from page 593*)

of phenol resins, such as normally made in actual industrial operations. The bending strength was used as a means for ascertaining this. For example, a block of Bakelite, 40 centimeters high from one base to the other, gave the following figures for resistance to bending, when measured at four different points, the maximum figures being given:

150, 260, 380 and 260 kilograms per sq. cm.

A rod of Juveltih showed a strength of 330 kg./sq. cm. and 350 kg./sq. cm, at its ends, but as high as 530 kg./sq. cm. at its middle. The occurence of the greatest strength at the center is caused on the one hand by the length of the flow of the mater-

ial, and the concomitant great opportunity for orientation of the particles at this point; while the lowered strength near the ends can be explained by the destruction, or partial destruction, of this perfect orientation, as the particles in their flow met with the end or bottom of the mold into which the material had been cast. The lessened strength near the top of the mold could likewise be explained by the fact that here the particles had not had as much opportunity to flow, and hence were not as perfectly oriented as near the center of the rod.

The Aminoplastics

Of particular importance and interest in this connection are the aminoplastics, which are the condensation products of urea and formaldehyde. The proper control and production of these difficultly handled materials was not attained until their colloid-chemical behavior had been thoroughly studied and understood as the result of research work undertaken by Pollak and Ripper; which led to the invention of "Pollopas," the glass-clear synthetic resin that has caused much comment of late. The earlier work in this field, based more on empirical relationship, such as the researches of John Goldschmidt, Neuss, etc., did not, therefore, lead to any technically important or valuable results. The very fact that the aminoplastics greatly exceed the phenoplastics as to their elasticity, is an evidence that in the case of these aminoplastics the proper collodial optimum has been more closely approached than in the case of the phenoplastics. For example, a rod of Pollopas has a modulus of elasticity of 850 kg./sq. cm; and a plate 600 kg./sq. cm.

In the domain of cellulosic plastic masses, such as the pyroxylin plastics and the cellulose acetate plastics, the simultaneous effects of mechanical as well as chemical plasticization can be seen to their best advantage. In the case of cellulose the filamentous nature of the raw material provides the required structure by forced and artificial means; this even being true of the esters of cellulose, which retain their fibrous structure. For this reason, in the case of cellulosic plastics, the conditions leading to the necessary chain formation is superior than it is with most of the other organic plastic materials.

Cellulose Compounds

When working with cellulose derivatives, the object to be attained is, primarily, a liberation of the fiber and a shortening of the same. Even the nitration of the cellulose initiates a dispersion of its particles, at least to the extent that both nitric acid as well as sulfuric acid exert a swelling action upon the cellulose. This is increased in the following treatment during the stabilization, and especially by the continued grinding in the collanders in presence of water. The final peptizing occurs when the camphor is mixed with the cellulose nitrate in the production of pyroxylin plastics.

In the manufacture of pyroxylin plastics, and especially with the material filtered on an hydraulic press, as described by L. Menieur in his "Chimie des Colloides et Applications Industrielles," there occurs, by reason of the streaming action of the material as it passes the sieve-like inserts in such presses, a very distinct flow aggregation. For this reason the elasticity of the pyroxylin plastics is high. This is likewise true of the acetyl cellulose plastics; and for both cellulose esters is higher than that of the other plastic artificial products. The elasticity of the cellulose ester plastics varies in accordance with the amount of camphor or other plasticizing agent added, a standard product having a modulus of elasticity of from 2500 to 7000 kilograms per square centimeter. This compares well with that of hard rubber, which is about 2400 kilograms per square centimeter.

Vulcanized Fiber

In the case of vulcanized fiber, in the technology of which there is but little plasticizing work done on the fibers and plant particles, and in which the reactions restrict themselves to a superficial gelatinization of paper fiber, the elasticity is nowhere near as great as with the cellulose ester plastics. Two different forms of vulcanized fiber, from two separate sources, showed a modulus of elasticity of from 13,500 to 25,000 kilograms per square centimeter.

From the preceding considerations it will be quite evident, that, aside from questions of raw material, temperature and the like, that the true plasticity of an organic plastic material will depend to a large degree upon the amount of work done on the same. In other words, the degree of disaggregation and reaggregation that the material has gone through in its course of preparation will be a very important factor in deciding the properties of the final product.

MOLDED PRODUCTS

Devoted to the purchase, further use and merchandising of all manner of molded parts

Vol. 1 NOVEMBER, 1927 No. 7

Making for Better Oil Burners

The modern automatic oil burner exemplifies the application of molded phenol resinoid where reliability is essential and where insulation value must not fall off on exposure to heat, oil and moisture

IT is a far cry from the marine boiler room to the domestic basement, yet both are witnessing the same process of change —the displacement of coal by oil firing. Needless to recount at any length, the advantages of liquid over solid fuel. Such points as ease of fueling, absence of black smoke, general cleanliness, ease of regulation and last but not least, automatic stoking, are evidence enough of this superiority.

Modern naval warfare demands from a fuel qualities such as these enumerated. And to meet them, the oil-fired battleship soon made its appearance. Next in line for this change-over came the merchant marine, and it is only within the last year or so that oil-burning furnaces have come into extensive use for home-heating.

Why, with so much to be gained, was the change so slow? The answer is that it took quite some time to develop a reliable automatic oil burner. This should occasion no surprise and for this reason. In the case of marine and commercial installations, a trained personnel is usually at hand to overlook their operation. Domestic burners, from the very nature of things, must function automatically for long periods in the absence of any skilled supervision. Other requirements for the successful oil burner are first safety, then reliability, economy, quietness and flexibility.

A Competitive Market

So firm a hold on the minds of progressive manufacturers have the advantages of the domestic oil burner obtained, that there are now more than one hundred makes of such appliances on the market. Some of these are backed by names of renown in the oil and mechanical fields. Indeed, this market is now as highly competitive as that of that other domestic device, the automatic refrigerator.

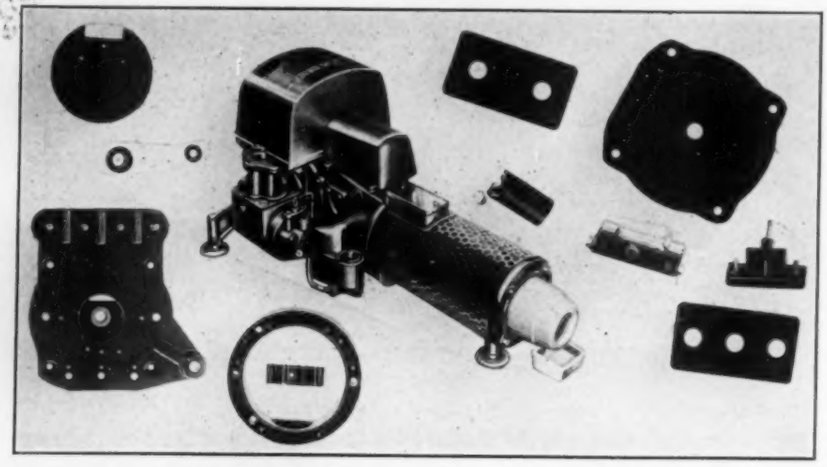
In the past, in numerous connections, we have outlined the many advantages that can accrue to the finished product, through the incorporation of components, molded of phenol resinoid. For example, such parts, properly molded and designed, are strong, durable, of good appearance and are endowed with considerable heat resistance, this last capable of enhancement by suitable compounding, as with asbestos.

Further, they are non-conductors of both heat and electricity, properties not possessed by metals. Thus it happens that the molded resinoid part can often gainfully replace the corresponding metal component, a state of affairs reflected by the long and growing list of successful metal substitutions.

Realizing their concomitant advantages, it was only a matter of course, then, that makers of oil burners soon availed themselves of these molding materials. For the purpose in view, such parts can offer strength, resistance to heat, to oil and to high tension electric current together with pleasing appearance which lasts.

A striking example, one moreover which crystallizes out the versatility of the phenol resinoid Bakelite, is the Socony Arrow Burner, sponsored by the Stand-

ard Oil Company of New York. In its construction, there enter no fewer than thirty-three molded Bakelite constituents.



From one to ten each of sixteen different Bakelite parts are used on the Socony burner. The molded component (lower left) has eleven holes, four recesses and twelve metal inserts. The entire piece is completed in one operation.

These include such comparatively simple pieces as washers, besides several very complicated structures. One of the latter has twelve metal inserts, eleven holes and four recesses. It instances in no uncertain manner the possibilities of the molding process. Easy to realize what molding such a part means for economy in production and assembly processes. Again, a point often overlooked, is the saving of floor space due to the one and comparatively simple process replacing the many and frequently complicated. No need to bake oil-proof enamel on these parts—an oil-resisting polish is imparted in the mold itself.

A partial list of the Bakelite parts used in this burner would comprise:—on the combustion and fuel oil safety switches, respectively,—frame, oscillating contact plate, and switchbase; on the high tension system,—conduits, insulating protector plate, bushings and washers; on the air supply system,—valve seat. Other Bakelite parts are found where there is a call for resistance to wear, and to the effects of lubricating oil. The quality of quiet operation, a far from strong point with some burners, would be improved by their incorporation.

Apart from the burner itself, which, in essence, consists of a combustion chamber equipped with spraying nozzle and furnished with the necessary operating and control motors, molded resinoid parts find a place in accessory equipment. A case in point is the Minneapolis Automatic Control Clock. This is provided with a resinoid back as well as rods separating the control magnet pieces made of the same material.

In fine, wherever insulation value must not fail under exposure to heat, oil, fumes and moisture, and where silent operation is essential, there is a good case for considering the incorporation of the molded resinoid constituent.

The Advance of Color

"It must have been the persistent influence of the Puritan tradition that made manufacturers so suspicious of beauty and gave them such pathetic faith in mere ugliness. They seldom found it necessary to make a thing beautiful in order to make it useful."

This quotation from a recent article by Earnest Elmo Calkins in the Atlantic Monthly headed a prominent department store's announcement entitled "Color Comes Into Your Kitchen."

• • •

ON several occasions recently, reference has been made to the manifold ways in which manufacturers are utilizing beauty and bright color to solve their merchandising problems. So widespread have these trends become, that it it is felt to be in order to return to the subject once again.

Aluminum kitchen ware with handles in colored translucent casein solid.

With regard to color, what, for example, could be more conservative than the dinner jacket? Yet this emblem of formality in attire is feeling the effects of the infiltration of color. For according to the fashion journals, the black Tuxedo is no longer *de rigueur*, but blue may serve to heighten "sax appeal."

(*Continued on page 628*)

An Improved Washing Machine "Dolly"

Representing a unique case of successful metal replacement, the incorporation of this molded component leads to less damage to the clothes and more efficient operation of the whole machine.

From the viewpoint of merchandising the complete appliance, the molded washing machine impeller or "dolly" presents many unique features. These have already been discussed in connection with the Meadows Manufacturing Co.'s publicity campaign. In what follows are described the advantages to be expected in service from this molded part, substantially as they appear in the inventor's specification.

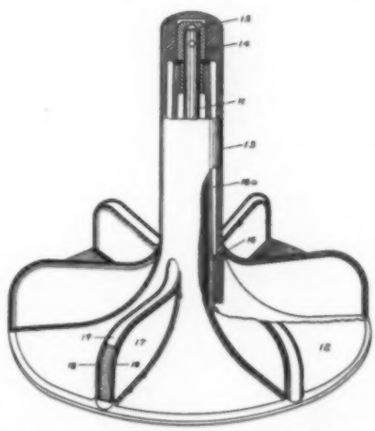
* * *

THE provision of a novel and improved agitator (dolly) for washing machines is the object of this invention. It refers to the material and structure of such a component, and for purposes of illustration, the agitator is one intended to be operated at the bottom of the tub and to induce both sideways and upward movements of the washing fluid.

Advantages of Resinoid

Made of synthetic resin for instance, a material lighter than metal, better service is claimed. For, with such a dolly, the shock attending reversing action would be reduced to a minimum.

Figure 1 is a perspective view of an agitator, partly in broken section and presents diagrammatically a driving member for it. In the drawing, 11 is a shaft adapted to be oscillated alternately in opposite directions. 12 is the disc portion of the dolly, adapted, in practice, to be seated approximately at the bottom of the tub, and 13 is a sleeve connected with the disc and reaching above the normal water line. 14 is an angular portion at the inside upper end of the sleeve, adapted to rest upon and grip a similar angular portion 15 of drive shaft 11. 16 refers to relatively offset portions of a column 16a to provide a bearing surface between this column and the sleeve 13. This permits centering these members respectively so as to prevent lateral shift of the lower portion of the dolly from hitting the container contents during operation of the machine.



A perspective view of the molded impeller, partly in broken section.

Special reference is made to the agitator blades generally referred to as 17. These are preferably formed integrally with the body of the agitator and are disposed at spaced intervals about the upper face of the disc. The blades are formed from comparatively thin wall members 18, spaced apart, as shown, and united at their upper and outward face portions by a wall or bridge portion 19. In this way there is formed a narrow channelway between the blade sections that serves for strengthening as well as reducing the weight of the agitator as a unit, and in addition serves to present a wide surface that will not tear or damage the clothes in the container when the agitator is working.

In practice, reverse action attending the operation of agitators, when these are formed from metal or such absorbent material as wood, has resulted in excessive jar and attendant strain. In the case of metal this arises from the weight. When made of wood it becomes very heavy when soaked with water. This jar and attendant strain has caused wearing action upon the machine parts and unnecessary power requirement.

Wood and Metal Replaced

The present invention contemplates the formation of the agitator from a condensation product belonging to that group of chemical compounds known as synthetic resins. The use of such a material affords many important advantages not possible in washing machines when using wood or metal.

The agitator is impervious to water, is much lighter than metal, and is far more serviceable. It does not corrode, and even after a long period of service, the active surfaces remain smooth and unbroken. After use, a metallic dolly becomes corroded and covered with a scale which results from the action of the soaps and alkalies used in the washing operation. Such a roughened dolly has a disastrous effect upon clothes, especially if they are of fragile and soft material. A dolly formed from the synthetic resin material retains its original smoothness, throughout its life, and in addition does not warp nor bend. Owing to its light weight, the operation of the

(*Continued on page 640*)

Bakelite Corporation's exhibit at the Eleventh Exposition of Chemical Industries, displayed numerous ways in which Bakelite materials have been applied to varied industry—chemical, mechanical, electrical, radio, transportation, etc. In the foreground are snagging and grinding wheels of abrasive bonded with Bakelite.

At the Exposition of Chemical Industries

By A. Moses

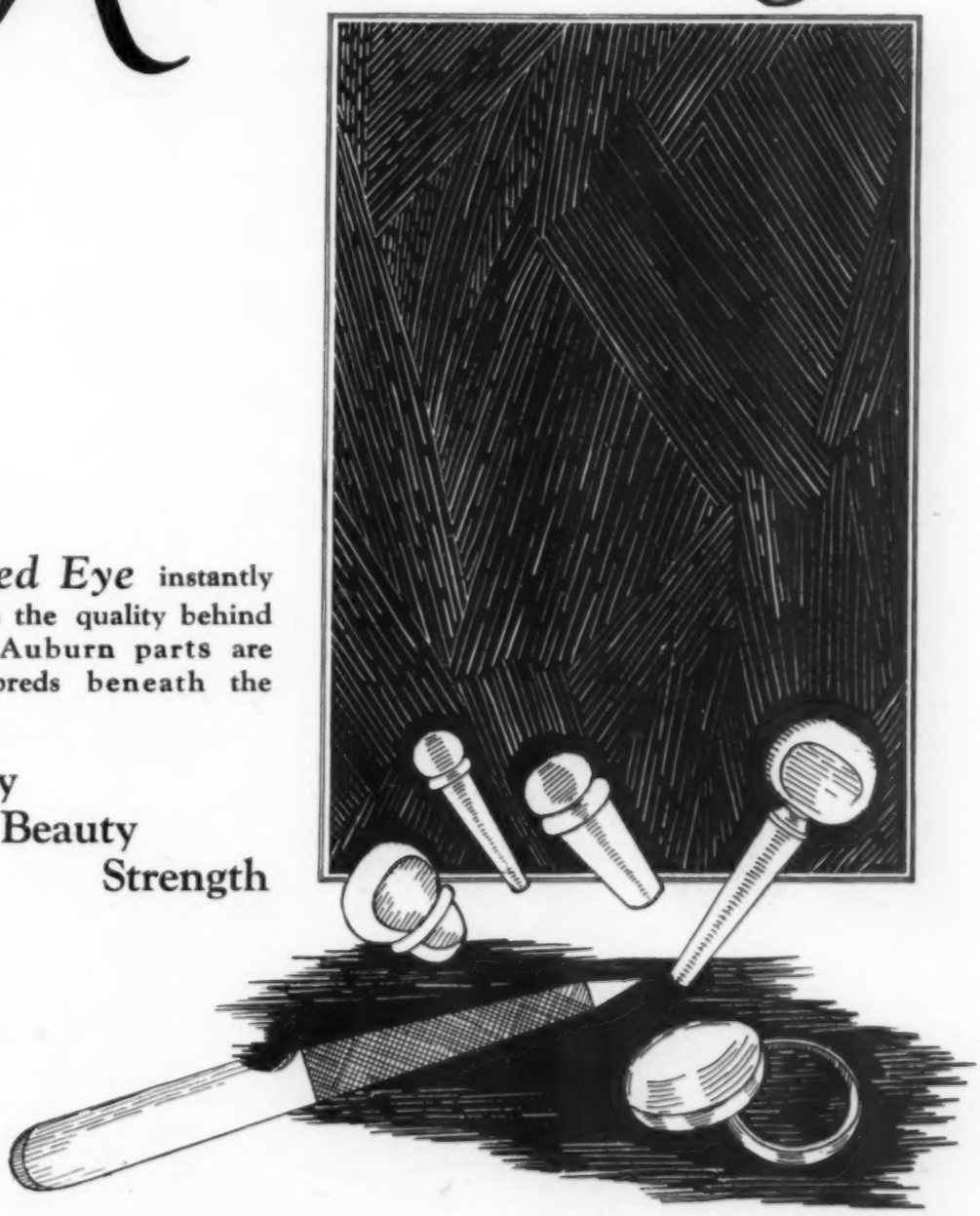
PROGRESS is the keynote of modern chemical industry. In this so-called "Age of Synthesis" the chemist is truly a creator, for the laboratory rarity of yesterday has often developed into the industrial material of today. Plastic materials are typically the chemist's achievement. Coming in the van of his triumphal march, these materials formed many an outstanding display at the Eleventh Annual Chemical Industries Exposition, held at the Grand Central Palace, New York City. Among the host of exhibits competing for an informed public's eye, they nevertheless succeeded in attracting a goodly share of interested attention.

Tasteful layout combined with cheerful colorfulness, enabled the products of the plastic art to vie successfully with the manifold exhibits in this vast collation, where synthetic resins, casein solids, pyroxylin and cellulose acetate products were all represented together with some machinery and certain ingredients.

The decorative and colorful booth of the Karolith Corporation. Particularly noteworthy are birdcages and Karolith-shaded lamps.

On the main floor, in its uniquely Gothic setting, the Bakelite Corporation's attractive booth hummed with activity. The arrangement was similar to this organization's display at the Radio World's Fair, each of the six wall panels representing a phase of proved applications. One panel instanced some of the numberless wiring devices and switch plates molded of Bakelite. Of particular interest on this was a special monogrammed plate molded by Reynolds Spring Co., for the Hotel Stevens, Chicago, and a transformer cover for an electric bell.

Auburn



The
Trained Eye instantly recognizes the quality behind beauty. Auburn parts are thoroughbreds beneath the surface.

Quality
Beauty
Strength

Auburn Button Works, Inc.

AUBURN, NEW YORK

A second panel indicated the versatility of this resinoid in the widely-ramified electrical field. Prominent here was a controller shaft of laminated stock, square in section, for use on mine equipment made by the Jeffrey Manufacturing Co., Columbus, O., while a number of dynamo brushes stood as examples of the use of graphite-containing material.

Domestic Appliances

Representing the molded component on domestic electrical appliances, was the switch bar on the overload switch of the Syracuse Easy Washer. This switch is designed automatically to stop the washer should functioning of the machine be interfered with as by an obstruction. The Hoover Vacuum Cleaner (brush-holder frame and screws) and the Aluminum Cooking Utensil Co.'s Dutch oven (high heat resisting skillet handle) were further instances.

Panel number three was concerned with applications dependent upon resistance to chemical action. It included a molded electro-plating bath, and a mustard distributor "Mustomatic" such as is used in Nedick's stores. Among other interesting items were a salve jar and a holder for the small platinum weights in the chemist's usual set (Thomson Balance Co.) On one of the side tables was a collection of chemical ware cast and then machined from the transparent material. Such apparatus is particularly suitable for manipulating hydrofluoric acid, in etching processes, for example. (Apex Specialties, Brooklyn.)

Mechanical applications were featured on another panel with such parts as faucet handles and fittings, conical gears, abrasive wheels bonded with Bakelite. Worthy of note was a gasoline blowtorch wheel. Originally made of cast iron, the resinoid is now used because of its better appearance and resistance to heat. Another notable specimen was a ball retainer used on a pneumatic grinder (Excello Tool Co., Detroit.) Machined from the laminated material, it has that quality of lightness so essential for rapid rotation.

Still another set of parts illustrated uses in transportation, mainly automotive. A magneto booster made of a special mica lowloss mix (Scintilla Magneto Co.) might be singled out. A partial list would include variegated gear shift balls, strap hangers, gears, coil case (Buick), spark plug cover (Franklin), headlight control, and Motometer frame.

The last panel of the series was devoted to radio parts and musical instrument components, two fields of usefulness already dealt with in these pages.

A small case on a side table held specimens of transparent material in nine different colors and effects, varying from opaque to almost water white. Of interest were a number of Japanese cameos cut from multi-colored Bakelite plates. Strikingly beautiful was a framed medallion molded to commemorate the centenary of Alessandro Volta (1827-1927). Here also stood a fine vase, molded in England, evidently made from a mix containing aluminum powder.

The Durez display was designed to demonstrate the wide applicability of the products of General Plastics, Inc. Prominent are bowling balls molded of Durez.

Karolith's Colorful Display

Leaving the synthetic resins for the moment, the casein solids next merit attention. An orderly riot of color would be the correct if paradoxical description of these decorative displays. Truly representative of the many-hued applications of this organization's product, the Karolith Corporation's booth was quite in harmony with today's most marked trend—brightness in color. Here, arrested by a flashing sign, lettered on Karolith blocks, the visitor was introduced to desk sets, manicure sets, cutlery and vanity articles galore. Prominent were various lamp shades and sconces, some of the former molded of the new Karolith molding compound, while Karolith bird cages with molded rings and floors added their quota to a veritable blaze of color.

Erinoid Exhibit

On the same floor, Erinoid Co. of America displayed some specimens of the applications of its versatile product. Special features here were cosmetic containers, cutlery with Erinoid handles, and sheet material with buttons pressed out ready for

(*Continued on page 630*)

Molding the Hippo in Cellulose Acetate

Chicago Field Museum savants' novel use of this slow-burning material

A hippopotamus is one animal which, once dead, cannot be made to appear very lifelike, acording to zoologists and taxidermists of the Chicago Field Museum of Natural History This is because of certain peculiarities of its skin.

However, a hippopotamus which looks as real as if it had just wallowed out of a stream in Africa to bask in the sun is now on exhibition in the museum. The secret is that it is a "synthetic" hippo made of a cellulose acetate, a slow-burning, celluloid-like material. This achievement is another case where a synthetic material is far superior to its natural counterpart, Dr. W. H. Osgood, curator of the department of zoology at the museum, explains. However, a real hippopotamus, is a necessary starting point in the process of making a "synthetic" one.

The reproduction of the hippopotamus was made by Leon L. Walters, of the taxidermy department of the Field Museum. the inventor of a special process for utilizing cellulose acetate in taxidermy. Hitherto this process was used by him only in the reproduction of reptiles, the wholly naked parts of the faces of certain monkeys, and the nosepads, lips and similar hairless areas of certain other animals. The largest previous use of the method was in Mr. Walters' reproduction of a group of crocodiles, on exhibition at the museum.

The hippopotamus in the present case is "Zeke" who met accidental death through swallowing a golf ball, while a resident of the Cincinnati zoo. The Cincinnati Zoological Park Association presented his remains to the Field Museum. He is the first hippopotamus, and for that matter the first large mammal of any kind, to be reproduced by the cellulose acetate method. What is more, his reproduction according to Dr. Osgood, is the first lifelike presentation of a hippopotamus ever shown in any museum.

The process was applied to the hippo because its dried skin is not lifelike, neither as to condition nor color. The actual skin of the hippo was mounted and used in modelling, however. Plaster matrices were made from it, and in these was molded the cellulose acetate reproduction, with the natural colors ingeniously processed in.

(*Continued on page 660*)

The Advance of Color

(*Continued from page 622*)

Color, also is being injected into the most sombre of life's episodes, if the recent convention of morticians were able to gauge the situation at all accurately. It seems that a rainbow pattern many now with propriety emblazon the casket, radiating a symbol of hope where heretofore there was unmitigated colorlessness.

Golf too is not immune. For club handles of vivid hue have been mooted to vie perhaps with the colorful language and apparel so inseparable from the royal and ancient game. And the list goes on growing....

Color a Potent Sales Factor

Color in kitchenware is a factor potent to increase sales. One manufacturer, for example, found that simply painting a bright stripe on his wares resulted in an important increase in sales. In this department, plastic materials have been applied with all their wealth of refined colorfulness, beauty and permanence.

An outstanding example of this innovation recently came to light. Reference is made to a brand of superlative aluminum ware on display at McCreery's Department Store, New York City. These utensils are provided with translucent handles beautifully colored. Inquiry revealed that the ware was of British origin and that the handles were casein solid. The latter are detachable and being non-conducting, non-inflammable, strong and sanitary, add materially to the serviceableness of the articles. A variety of effects are available including ruby red, amber and jade green.

Cutlery is another field in which the trend of color is asserting itself. As noted elsewhere in these pages, casein solid-handled cutlery formed many a decorative display in certain of the casein solid manufacturers' booths at the recent Chemical Industries Exposition.

Role of Plastic Materials

Further instances are handles on household electrical appliances and with the spread of the vogue of bright colors, plastic materials will no doubt be found ready to hand to assist its progress.

Why Do 4 Jobs When You Can Do Better With One?

WHY four orders—for molds, inserts, molding, assembling—when one order on International Bakelite Service would cover them all?

Why four responsibilities, four follow-ups, four concerns to look to for delivery when you can put all the responsibility onto us with one clean sweep? Pass the buck—we're equipped to take it because—

Our large production means every job *must* be out on time to clear production lines for the next. For our own protection your job has to go out when promised.

When we make molds, inserts and moldings, you look to us simply for the finished piece. It's our worry, not yours, that every single thing that affects that finished piece is precisely right, fits perfectly and meets all specifications.

Pass the buck. We'll show you that we can take it and deliver your complete job on time, right the first time, ready for your immediate use. We're looking for orders, not sympathy.

Send your specifications, for prices on any quantity.

Perhaps You're Losing Sales

—just because your product lacks, somewhere, the advantages, sales points, economies which Bakelite could give it.

Do you realize that many products now requiring machining or hand finishing could be molded of Bakelite and come out of the mold ready for immediate use, without a particle of finishing?

Perhaps your product or some part of it contains bushings, screws, plates, inserts that have to be fitted or assembled by hand into metal housing when they could be molded in Bakelite housing at one operation.

You may be using heavy metal where Bakelite would reduce weight and cost yet retain strength.

You may be plating a part to resist chemicals or exposure when Bakelite needs no help for such resistance.

There are a hundred and one features of Bakelite—the modern marvel of industry—that you might employ to improve your product and reduce its cost. We will be glad to investigate for you, submit suggestions and prices, and let them speak for themselves. There is no obligation to you but there may be an important saving.

PRECISION MOLDERS OF BAKELITE AND SHELLAC COMPOSITION

INTERNATIONAL INSULATING CORPORATION

ESTABLISHED 1875 ELYRIA, OHIO

A famous oven regulator wheel in beautiful Chinese lacquer red Bakelite. More attractive and serviceable than as formerly made of metal.

Ammeter and voltmeter bases made of Bakelite for perfect insulation and permanent rigidity.

Collapsible radio loop base and wire bracket made from Bakelite to reduce cost. Molded complete in one operation.

The Chemical Industries Exposition

(*Continued from page 626*)

separating by the button-maker. The embossing had all the exquisiteness of fine carving. A new pearl material, which, so the writer was informed, took 17 years to bring to perfection, lamp transparencies, and, rather surprising, Erinoid-handled cork screws, were other noteworthy points in this variegated display.

Backed by an exhibiton of machinery, Inda, the casein solid made by the American Machine and Foundry Co., lent a touch of color to this concern's exhibit, and included toilet ware, desk sets and brushes, to mention only a few of the numerous specimens.

Durez Products

To revert to synthetic resins, Durez, the product of General Plastics, Inc., was there with a wide variety of molded parts. The underlying idea was to promote acquaintance with the versatility of Durez and its applicability in many industries. The collection varied all the way from collapsible tube tops to tool handles, and from art novelties to automobile applications. At prominent points in the booth, a number of molded bowling balls served to demonstrate how widespread are the uses of synthetic resins.

The General Electric Co. was the third member in the trio of exhibitors of resinoid molded products. Panels representative of Textolite Molded, and Glyptal, the merchandising marks for this Company's molded products and synthetic resin, respectively, stood somewhat abashed behind a display of silica glass, as beautiful as it was brilliant. The resins are glycerolphthalic acid condensates and are particularly useful for built-up ("pasted") mica insulation. Glyptal is available in a number of clear colors and beautiful effects.

The pyroxylin plastic art was represented by the Celluloid Corporation's display of Lindol and Celluloid containing it. Lindol is a highly purified and very stable form of tricresyl phosphate, a non-inflammable camphor substitute with many uses.

Molded Cellulose Acetate

In an adjacent booth was established American-British Chemical Supplies, a concern closely connected with the American Celanese Corporation. The chief interest of readers of PLASTICS would center on the extensive variety of articles of cellulose acetate.

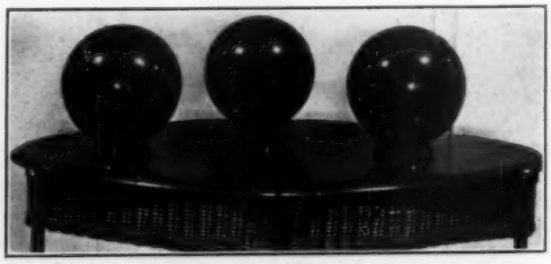
An object of much interest was the Bakelite-Micarta airplane propeller in the Westinghouse Electric & Mfg. Co.'s booth. This very timely application was the subject of a recent story in these pages (September, Page 486) and it was a trio of similar propellers that so successfully drew the plane piloted by Lieuts. Maitland and Hegenberger across the Pacific to Hawaii.

Strains can be set up at a sharp-angled bend in a material like pyroxlin plastic. This effect becomes evident in polarized light, a state of affairs interestingly demonstrated by a Westinghouse Co.'s exhibit.

Those essential ingredients of molded products, wood flour fillers, were displayed very comprehensively by the Becker-Moore Co.

While some of the general chemical equipment on view finds many a use in the manufacture of plastic materials, space is not available for its adequate description. However, there is one type of machine in almost universal use by molders—the preforming or tabletting machine. F. J. Stokes Machine Co. had one of these appliances actually at work on Bakelite molding powder. The

(*Conclued on page 640*)



A trio of cement-covered bowling balls molded of the resinoid Durez.

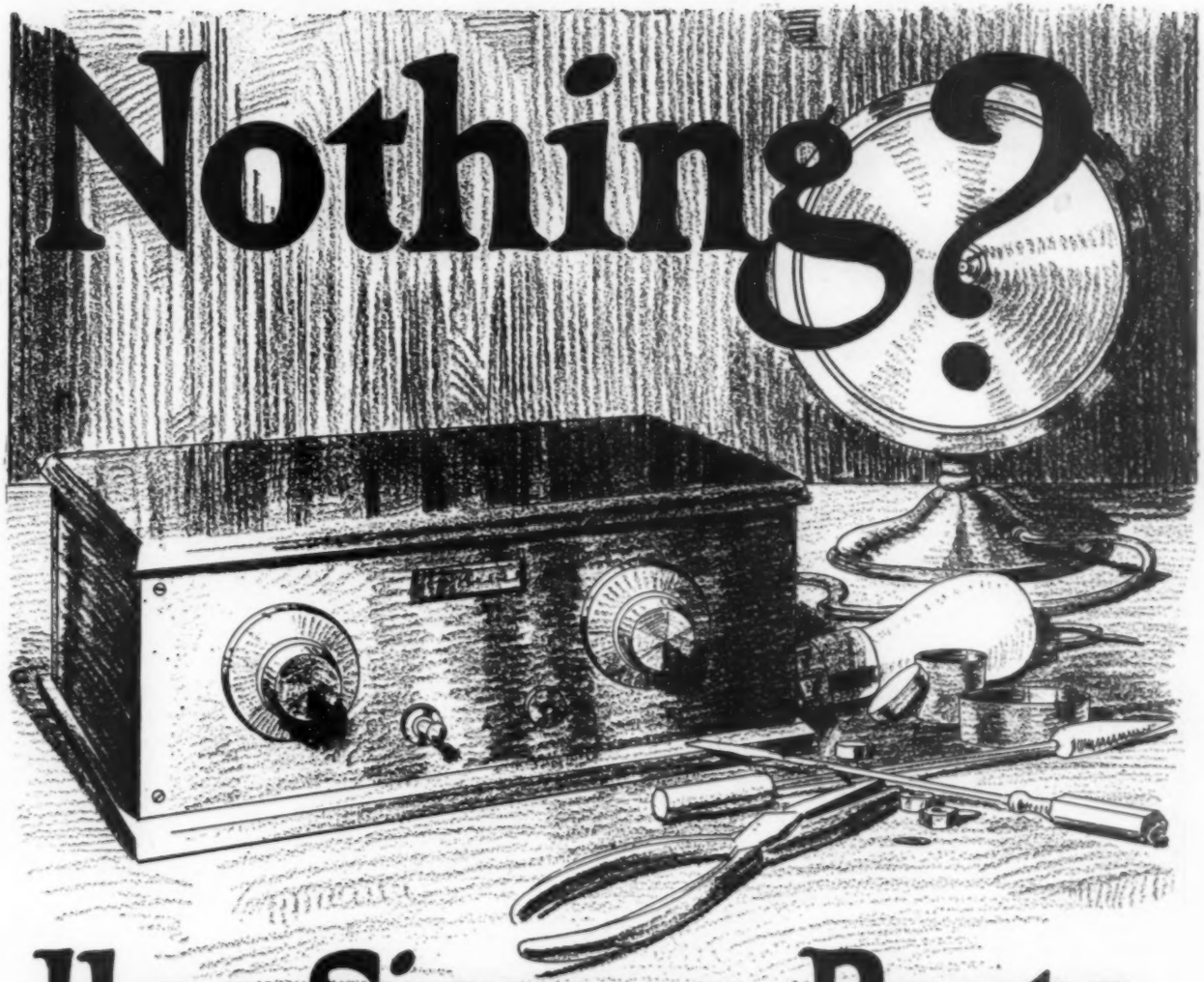
Resinoid Bowling Balls

IN the first number of MOLDED PRODUCTS (May, 1927,) attention was drawn to the many ways in which plastic materials have contributed to the more effective prosecution of sports. These applications have comprised such widely different accessories as duck calls and football cleats.

While bowling balls have long been made of wood and hard rubber, these materials have not been without their drawbacks.

Wood, with its natural moisture content and absorbent properties, needs very careful seasoning. Even so the grained and layered structure of the wooden ball leads to its shrinking out of shape with progressive drying out. According to one manufacturer, this shrinkage may amount to as much as one quarter inch in the first season of play.

Hard rubber, while endowed



Use Siemon Parts

Ball on the 1 yard line . . . . Last down---goal to go . . .
Fullback McGlone gets ready to smash thru . . .
. . . . . the ball is . . . . . .
ZZZzzzzzzzzzzzzzzzzzz
SILENCE

SHORT CIRCUITS, GROUNDS AND KINDRED RADIO TROUBLES ARE ELIMINATED BY THE USE OF SIEMON PARTS.

SIEMON CO.

BRIDGEPORT CONN.

Controlling
THE SPECIALTY INSULATION MFG. CO., Hoosick Falls, N. Y.
and
THE WATERTOWN MFG. CO., Watertown, Conn.

with uniformity, softens somewhat easily with a comparatively slight rise in temperature. At about 80° F. such balls "play" exceptionally well, that is they can be manipulated quite easily by the bowler on delivery. This ready "playability" is not without its disadvantages, however. Being an indoor winter sport, it is the general custom for players in a tournament to transport their balls from place to place. In this process, the rubber ball chills, in which condition, it is almost impossible to manipulate it well at a delivery. The consequence is that a "sharp break" "comeback" or "hook ball" cannot be bowled with accuracy.

Constant "Play"

Made of phenol resinoid, the bowling ball is devoid of these drawbacks. Not only does it not shrink with age, but the "play" stays constant even under a wide temperature change. Flat spots do not form nor is there any chipping at the finger-holes.

Leaving the mold with its polish already imparted, there is no tendency for the surface to become shabby with use. Further, both color and effect will be permanent, for resinoid materials cannot deteriorate in appearance with "sulfuring up," a change frequently occurring with hard rubber, due to the sulfur working up.

Cleanliness

Another important point is cleanliness. It is one of the distinctive properties of hard rubber to mark surfaces easily. This arises from the presence of carbon black pigmentation combined with the relative softness of the material. Blackening of the alleys results, a discoloration which does not occur with resinoid balls. This is due to the superior hardness of the latter in conjunction with the general absence of carbon black from the makeup.

It was with these possible advantages in mind, that Mr. Paul J. Klopsch, of Bayonne, N. J., undertook the molding of balls ("Ivo-Lite") from the resinoid Durez.

The "French" Type Telephone

THE production of the recently introduced "French" types of telephone desk sets, which it is understood are being molded from phenol resins, required the working out of novel molding methods, as a number of delicate inserts had to be accurately placed in these sets.

The problem was attacked by the Western Electric Co., about seven years ago, and the fruits of their labors have recently matured into patent form, as witness the following patent which was issued April 19, 1927, although the application dates back to August 5, 1921. Harry Earle Bohn and Raymond Homer Fauquier, both of Chicago, Ill., are the inventors, and the patent number is 1,625,449.

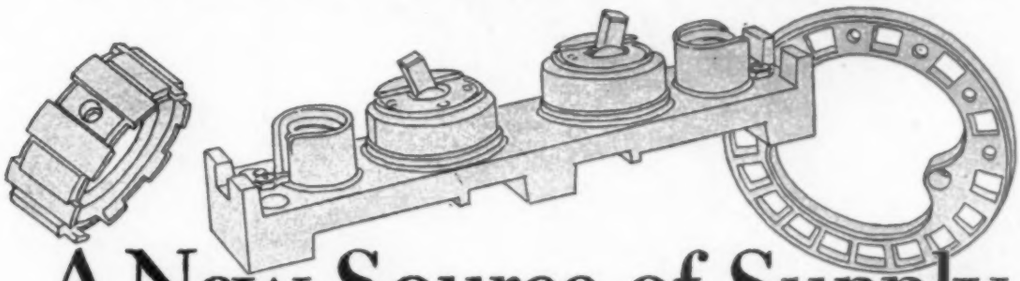
Delicate Inserts

This invention relates to a method of molding phenol resin or like compounds, and has for its object the molding of phenol plastic or like compounds into articles containing delicate or fragile inserts or connections.

A preliminary support is first molded or shaped and with the fragile inserts or connections carried, secured thereon, or supported thereby, is molded with a block of compound into the finished article.

More specifically, the method employed provides for molding or shaping the preliminary support by any suitable means from phenol plastic compound and placing the inserts in position upon the support which may have ridges, recesses, or bosses, etc., formed thereon during the molding for locating or securing the inserts. The preliminary support is then placed in one member of a mold, the inserts positioned thereon and a block of phenol plastic compound of a sufficient size then entered between the molds, and heat and pressure applied. While the compound is being propelled by the movable member of the

G-E TEXTOLITE MOULDED



A New Source of Supply for Custom-Moulded Parts

Textolite Moulded is the name to remember whenever you want a permanent and dependable source of supply of custom-moulded parts.

Here are shown a few of the large variety of intricate Textolite Moulded forms produced through the unlimited resources of General Electric's modern plants.

Purchasing agents are offered, in Textolite Moulded, that high quality which is typically G.E.; huge production facilities; a world-wide service; and all the economies resultant from scientific mass production.

Address all inquiries to the nearest General Electric Office.

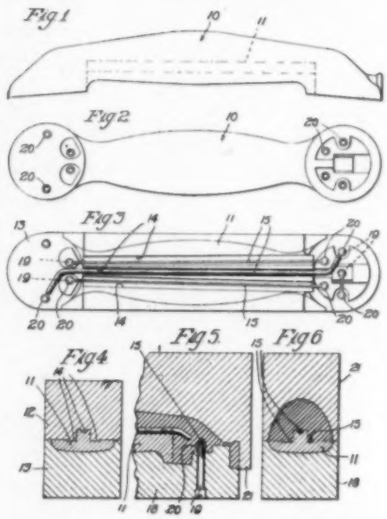
GE *Textolite Moulded*

885-11

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

mold the preliminary support prevents the dislocation, breakage or collapse of the inserts. When the heat has softened the compound including the support, the pressure has become equalized and there is no longer any unbalanced force, tending to displace, crush, or break the inserts. The support, being of the same material as the balance of the molding compound, blends with it perfectly during the curing process and is, therefore not distinguishable in the finished article. The molds are then cooled and separated and the finished article removed.



The method of supporting the delicate inserts.

In the drawings in which this invention is illustrated in connection with a handle for telephone sets:

Fig. 1 is a side elevation of the complete article;

Fig. 2 is a bottom view thereof;

Fig. 3 is a plan view of a die with a molded support in place and with inserts used in the finished article in position on the support and secured at their ends to the die;

Fig. 4 is a cross section of a punch and die with the support molded therebetween;

Fig. 5 is a longitudinal section through one end of the punch and die showing the complete article molded, and

Fig. 6 is a cross section of the punch and die similar to Fig.

Parts for Many Industries

We Produce
Molded Parts
for
Over 30
Industries

.....

To You---
We Offer
Quality and
Service
plus
35 Years'
Experience

.....

SHAW INSULATOR CO.

IRVINGTON, NEW JERSEY

Established SHAW 1892

4 but with the complete article molded.

In the practice of the method of this invention the complete molding operation is divided into two stages: First, the forming of a support, the purpose of which is to support whatever fragile inserts or connections are to be a part of the completed article, and second, the molding of the article itself, in which the support first molded is included.

Diagram Explained

As shown in Fig. 1 of the drawings, 10 represents a complete handle for a telephone hand set with a support 11 forming an integral part thereof shown in dotted outline. The support 11 is molded from phenol plastic or other suitable compound placed between a suitable punch 12 and a die 13, after which heat and pressure is applied. As soon as the compound has softened sufficiently to take the form of the molding cavity the punch and die are cooled as rapidly as practicable. This ends the chemical action beginning to take place in the compound (commonly known as curing) and solidifies the compound. The formed support is then removed from the die and is ready for the second stage. The support 11 is shown molded with recesses 14, 14 formed therein, the purpose of which is to position and support the circuit connectors 15, 15 during the subsequent molding operation.

Positioning Inserts

After the molding of the support 11 it is placed in a die 18 which is used in the subsequent molding operation and the connectors 15, 15 are then positioned in the recesses 14, 14 and secured in place by screws 19, 19 which are inserted through suitable openings in the die 18 and which engage internally screw threaded inserts 20, 20 provided at the ends of the circuit connectors 15, 15. After the final molding operation the screws 19, 19 are removed and the inserts 20,20 then form the means for connecting together and supporting transmitter and

Safe Handling of High Tension Wires

By utilizing the resistance of molded phenol resinoid at critical places, a member of the San Francisco Fire Department has developed a device making possible rescue from contact with high voltage lines

RESISTANCE to high tension electricity is an outstanding property of phenol resinoid products. This characteristic, allied with inertness to moisture and chemical fumes, makes for safety in operating electrical devices. Here is described a Bakelite device in which this safety service is utilized to the full.

The safety tong in action

A member of the San Francisco Fire Department (Arthur Ohlsen) has perfected a device for the handling of high voltage wires with such a degree of safety that it can be used to remove live wires from contact with the body. The tong is made from well seasoned white eastern maple, impregnated in paraffin wax to remove all moisture, sap, acid, and render it a perfect non-conductor and then lacquered. It is equipped with two operating handles or grips made of Bakelite. These handles will not crack, blister, nor deteriorate with age, and their material is chemically inert, impervious to moisture, steam and most acids and chemicals.

At one end of the tong are two fingers passing up through the pole and so attached to one of the Bakelite handles that when the latter is moved toward that end of the tong, the fingers will open and grasp the wire. When the handle is moved in the opposite direction, the fingers tighten up on the wire, permitting safe handling of the wire. The second Bakelite handle forms a grip at the other end of the tong.

The illustration depicts the manner of using the device for removing a charged wire from contact with a man working on a ladder.

Severe trials prove that the device is both safe and practical. It has withstood as much as 225,000 volts without leakage and has been tested to 160,000 volts to ground and held for 60 seconds without leakage.

"French" Type Telephones

(*Continued from page 634*)

receiver members of a telephone hand set on the handle 10.

In the Mold

In the final molding operation a block of the required amount of phenol plastic or other suitable compound is placed on the support 11 supported in the die 18 with the connectors 15, 15 secured in place as described above, after which a punch 21 and the die 18 are closed. Heat and pressure are then applied and after curing is complete the die is cooled the punch and die separated and the molded article removed from the die.

The action within the molded cavity during the final molding operation may be described as follows:

When the heat and pressure are applied the formed support 11 is in a solid state and holds the circuit connectors 15, 15, or in another article a different form of insert which may be fragile, in position, preventing their dislocation, collapse or breakage by the molding compound propelled by the punch 21.

By the time the heat has softened the phenol plastic, including the formed support in the die cavity, the pressure has become equalized and there is no longer any unbalanced force tending to displace, crush, or break the inserts, which therefore remain in their proper position. The support being of the same material as the balance of the compound used in molding the comple.. article blends with it perfectly during the curing process and is therefore not distinguishable in the finished article.

A Claim

Of the seven claims, claim one reads:

"The method of molding phenolic condensation products into articles with a delicate or fragile insert or connection, which consists in partially treating some of the product to provide a support for the insert or connection, placing the insert or

connection on the support, and then molding an additional product with the previously partially treated product to enclose the insert or connection and to complete the molding of the article into a homogeneous mass.

Molded Washing Machine "Dolly"

(*Continued from page 623*)

machine is rendered less expensive due to the fact that less power is consumed in reciprocating the dolly.

Such a dolly is more sanitary than the previously known metallic and wooden parts, as it does not develop permanent accumulations of deleterious matter such as dirt and grease. It has proved more efficient owing to the resulting increase in water agitation. This is probably due to the fact that a dolley formed of a product that is the result of chemical reactions or substitutions has less skin friction than the usual metallic dollies.

Silent Washing

A further advantage is that much of the noise incident to the operation of former washing machines of this type is eliminated.

Still another very important gain is that the impeller is a non-absorber and non-conductor of heat. The results are that the bearings on which the dolly is mounted are shielded from the heat of the Washing fluid and that the dolly itself may be readily removed if desired immediately after the washing is finished.

This invention is covered by Re. 16,743 of Sept. 20, 1927, a reissue of U. S. original specification 1,617,030, allowed to John Rocke on February 8, 1927. The impeller used on the Meadows Washer was molded of Bakelite by Chicago Moulded Products Co.

Chemical Industry Exposition

(*Concluded from page 630*)

Baker-Perkins Co. was there with the last word in their own specialty, mixing and malaxating machinery.

Space does not suffice even to outline exhibits of less direct interest in this epoch-making show. About it one can say with perfect assurance, that it adequately fulfilled its mission—that of promoting that great group of key industries developed and controlled by chemical science.

Molded Hippo of Cellulose Acetate

(*Concluded from page 628*)

Hairy animals, and birds with their feathers, can be satisfactorily preserved in the original for museum purposes, Dr. Osgood states, but the successful reproduction of the hippo, he believes, marks the beginning of a new era in the taxidermy of creatures of its general type, one which does not retain a lifelike appearance under the usual methods of treatment.

Advantages of Cellulose Acetate over older methods.

Other advantages for the new exhibit, claimed by Dr. Osgood and Mr. Walters, are its durability and the ease with which it can be kept clean. Whereas actual specimens of animals deteriorate with age, this kind is expected to last hundreds of years, long after the hippopotamus family will probably have become extinct. It can be washed with soap and water, where the actual hides of animals present a problem when they become dirty.

Advertisers Index

Say you saw it in PLASTICS

BUYERS' GUIDE

ACCUMULATORS
The Burroughs Co.
The Dunning & Boschert Press Co. Inc.
Hydraulic Press Mfg. Co.
Chas. F. Elmes Engineering Works
French Oil Machinery Co.
R. D. Wood
A. B. Farquhar

ALADDINITE
Aladdinite Co.

BAKELITE
Bakelite Corporation

BLEACHED SHELLAC
Geo. H. Lincks

BLOOD
Jungmann & Co.

BOILERS
Syracuse Steam Generator, Inc.

CAMPHOR (Synthetic)
C. B. Peters Co.

CASEIN
Jungmann & Co.
T. M. Duche

CASEIN PLASTICS
Aladdinite Chemical Products Co.
Karolith Corp.
Erinoid Co. of America
American Machine & Foundry Co.

CELORON
Celoron Co.

CELLULOID
Celluloid Co.

CELLULOID SCRAP
Johnson Products Co., Inc.

CELLULOSE ACETATES
Jos. H. Meyer Bros.
American British Chemical Supplies Co.

COLASTA
Colasta Co., Inc.

COTTON FLOCK
Peckham Mfg. Co.

CUSTOM MOULDERS
American Insulator Co.
Allen & Hills, Auburn, N. Y.
Auburn Button Co., Auburn, N. Y.
Braylite Molding Corp., Jersey City, N. J.
Boonton Molding Co., Boonton, N. J.
Celoron Co.
Chicago Molded Prod. Co., Chicago, Ill.
General Elec. Co.
General Industries Inc.
International Insulating Co. Inc.
Kellogg Switchboard & Supply Co.
Kuhn & Jacob, Trenton, N. J.
Mack Molding Co., Little Falls, N. J.
Modern Molded Prod. Co., Providence, R. I.
Northern Indus. Chem. Co., Boston, Mass.
Norton Laboratories, Lockport, N. Y.
Recto Mfg. Co., Cincinnati, Ohio
Schneider Elec. & Mfg. Co., Chicago, Ill.
Scranton Button Co., Scranton, Pa.
Shaw Insulator Co.
Siemon Co.

DIES
Standard Tool Co.
Grimes & Harris

DUREZ
General Plastics Inc.

ERINOID
Erinoid Co. of America

FIBERLOID
Fiberloid Corp.

GLASS, SILVERED
Standard Mirror Co.
Tassi Bros.

GUMS
France, Campbell & Darling
Geo. H. Lincks
Wm. H. Scheel

HYDRAULIC EQUIPMENT
Evarts G Loomis Co.
Hydraulic Press Mfg. Co.
Terkelsen Machine Co.
Burroughs Co., The,
Watson-Stillman Co.
Chas. F. Elmes Engineering Works
Southwark Foundry & Mach. Co.
Dunning & Boschert Press Co.
French Oil Mill Machinery Co.
A. B. Farquhar
R. D. Wood Corp.

INDA
American Machine & Foundry Co.

KAROLITH
Karolith Corp.

LABELS
Economy Ticket & Label Co.

MANICURE ARTICLES
C. J. Bates & Sons, Chester, Conn.

MEASURING MACHINES
F. J. Stokes Mach. Co.

MIRRORS
Standard Mirror Co.
Tassi Bros.

MOLDING POWDERS
Bakelite Corp.
Celoron Co.
Colasta Co., Inc.
General Plastics., Inc.

PEARL COATING
American Pearl Essence Co.
Jos. H. Meyer Bros.
Paispearl Co.
Specialty Pearl Mfg.
E. W. Wiggins
Geo Morrell, Inc.

PHENOL RESINS
Bakelite Corporation
General Plastics Inc.
Colasta Co., Inc.
Celoron Co.

PUMPS—HYDRAULIC
The Dunning & Boschert Press Co. Inc.
Hydraulic Press Mfg. Co.
Chas. F. Elmes Engineering Works
French Oil Mch. Co.
R. D. Wood Corp.
A. B. Farquhar
Terkelsen Machine Co.

PYROXYLIN PLASTICS
Bernhard, Adam
Fiberloid Corp.
Nixon Nitration Works
Celluloid Co.
Jos. H. Meyer Bros.
Du Pont Viscoloid Co.
American Celutex Corp.
E. W. Wiggins

RECLAIMERS
Johnson Products Co., Inc.

ROLLING MACHINERY
Evarts G. Loomis Co.

SHELLAC
Geo. H. Lincks
Wm. H. Scheel
Henry W. Peabody Co.

SWING JOINTS
Burroughs Co., The,
Evarts G. Loomis Co.
French Oil Machinery Co.
Hydraulic Press Mfg. Co.
Flexo Supply Co.

TICKETS
Economy Ticket & Label Co.

TOOLS
Standard Tool Co.

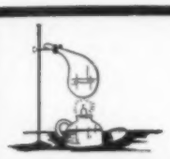
TUMBLING
Rudolph R. Siebert

VARNISHES
Celoron Co.

VISCOLOID
Du Pont Viscoloid Co.

WOOD FLOUR
Acme Oil Co.
Becker Moore Co.
John C. Hoornbeek's Sons Co.
C. B. Peters Co.
S. S. Spiro
Burnett Co.
Jungmann & Co.

This is a carefully classified index of concerns who specialize in this industry and who advertise regularly in PLASTICS. Please mention PLASTICS when writing to these firms.



Materials
for the Plastics Industries

Plastic fabrication is now at the peak of production. Delivery promises have been made and must be kept. Delays are costly. You cannot afford to experiment with materials of untried quality.

Draw on our ample stock of Sheets, Rods and Tubes to carry you through this period.

Use "AMERITH — The Master Plastic" and be assured by its unfailing quality that your production schedule will work smoothly.

Made by

CELLULOID CORPORATION

290 Ferry Street, Newark, N. J.

Sales Offices: 58 West 40th St., New York City

36 South State St. Chicago | 97 Water St. Leominster | 340 Sansome St. San Francisco | 188 Morris Ave. Providence | 52 Chauncy St. Boston